

ETHNIC DISTRIBUTION AMONG U.S. NAVY OCCUPATION SPECIALTIES  
AND RANKS:  
ORGANIZATIONAL IMPLICATIONS

by

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A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL  
OF THE UNIVERSITY OF FLORIDA IN  
PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

1984

To Carol: Your love and understanding through these years mean more to me than I can possibly say.

To Matt and Tony: You guys have done a super job of being kids and growing up. You have both been a tremendous source of joy and strength to me.

## ACKNOWLEDGEMENTS

This dissertation is symbolic of the completion of a change in the course of my professional life and personal philosophy. This change began in Viet Nam in 1966 and, over these many years, has been strongly influenced by a few people. Some of these people had an influence over a long period of time and under stressful conditions. With others the encounter was brief, but, in its timing and impact, nonetheless resulted in a change in my direction. While several of these people will not see this work, I would still like to thank them and acknowledge their contribution to it.

Ngo Dien Liem

Dick McGonigal

Earl Fedge

Joe Feagin

Gene Davis

Ben Gorman

I would also like to thank my chairman, Ben Gorman, for his additional support and guidance throughout this project, and especially for his sensitivity to the demands of my family life while I have been a student.

Members of my committee, James Button, Cynthia Rexroat, Joseph Vandiver, and Charles Wood, read and critiqued this and several previous drafts of this work. Their comments and assistance are greatly appreciated.

Finally, this study could not have been completed without the data provided by the U.S. Navy. The assistance of the Commander Naval Military Personnel Command Office of Equal Opportunity (NMPC N-61D1) and the Commander Naval Recruit Command (COMNAVCRUITCOM) are particularly appreciated.

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Abstract of Dissertation Presented to the Graduate School  
of the University of Florida in Partial Fulfillment of the  
Requirements for the Degree of Doctor of Philosophy

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December 1984

Chairman: Benjamin Gorman  
Major Department: Sociology

This study examines the effectiveness of the U.S. Navy's achievement of the goal of occupational placement and advancement of minority ethnic groups through affirmative action.

Data for the study are the aggregated number of white, black, and Hispanic enlisted males in Navy occupation specialties in 1976, 1979, and 1982. Controls for three levels of occupational qualification are included.

The study tests three models which attempt to account for the distribution of black, white, and Hispanic ethnic groups in occupation specialties and ranks. The first two models



assess the degree to which the cohort of available candidates or minorities with discretionary power affect the occupational and rank distribution. The third model determines the degree to which minorities are excluded from those occupations which represent the core technology of the Navy.

Findings from the first two models suggest that both the cohort of minorities available for promotion and minorities in discretionary positions positively affect occupational placement of minorities, with minorities in discretionary positions having the stronger effect. Findings from the third model strongly suggest that, when skill levels of occupations are controlled, blacks and Hispanics are overrepresented in support occupations and underrepresented in core technology occupations of the Navy.

## CHAPTER I INTRODUCTION

### Purpose

The purpose of this study is to examine the effectiveness of the U.S. Navy's achievement of the goal of occupational placement and advancement of minority ethnic groups through affirmative action. The study will describe changes in the distribution of black, white and Hispanic enlisted males in Navy occupation specialties and ranks between 1976, 1979 and 1982. It will also test three models which attempt to account for the distribution of black, white and Hispanic ethnic groups in occupation specialties and ranks.

The current political and societal emphasis on increased military readiness and voluntary military service make it increasingly important that the Navy make maximum use of its personnel. National population projections of draft-age youth through the year 2000 indicate that, while the military age population (18-26) is declining, the percentage of blacks and Hispanics in this population is increasing. It is therefore critical that any analysis of complex organizations, particularly the military, consider efforts by organizations to adapt to changes in this environment.

A major problem with research on goal accomplishment in an organization is that organizational goals are not always clearly identified or are not communicated through the organizational structure to those responsible for their achievement. Since affirmative action goals are specifically identified in writing, and action programs designed to achieve the goals are promulgated, the evaluation of the achievement of affirmative action goals in an organization makes an excellent subject for research.

Research on the accomplishment of affirmative action goals in complex organizations has also been hampered by the availability of data. Data on occupational specialties in private sector organizations are usually reported in imprecise categories such as management, clerical, and production. Data on hierarchies are also vague. Levels such as management, supervisory, and non-supervisory, or "salaried" and "hourly" are the usual categories encountered. Due to the mixing of these categories, it is often impossible to separate occupation specialties from hierarchical placement in an organization. Categories such as line management, staff, production, and clerical are examples of confounded specialty and hierarchy categories.

The military, as a complex organization, closely approximates an ideal type organization in having and explicitly labeling discrete divisions of labor by both rank hierarchy and occupation. The Navy, for example, has 104

enlisted occupation specialties and 9 levels of hierarchical ranks within each occupation specialty. The specificity of these occupational and hierarchical categorizations and the availability of administrative data make the Navy an excellent organization for the study of organizational behavior.

### Background

The Navy has established broad occupational fields called Navy occupation specialties which encompass similar duties and functions and which require related patterns of aptitudes and qualifications. The occupation specialties provide paths of advancement for career development and are the primary means of identifying personnel requirements.

Applicants to the Navy are offered certain occupation specialties based on the Navy's evaluation of their potential. Education and scores on a battery of aptitude tests (Armed Services Vocational Aptitude Battery, ASVAB) are the primary measures utilized. Based on a combination of ASVAB score and education, applicants are given a list of occupation specialties for which they qualify. Based on the applicant's eligibility for the occupation specialty and the needs of the Navy for persons of that particular specialty, most enlistees are guaranteed a particular specialty and are assigned to the technical school ("A" school) which will qualify them for that specialty. Navy recruits, on the

successful completion of recruit training and "A" school, are then assigned to duties within their occupation specialty in fleet units.

While most enlistees in the Navy gain their occupation specialty through "A" school, in some cases a specialty may be gained through on-the-job training and completion of correspondence courses. A few enlistees also are assigned to fleet units directly from recruit training and then, through on-the-job training and correspondence courses, demonstrate that they have the potential for a particular occupation specialty. In these cases, the enlistee is assigned back to the "A" school to qualify in the specialty and is then reassigned to the fleet.

Enlistees in ranks E-1 to E-3 with occupation specialties are referred to as "designated strikers". Fifty five percent of personnel in these ranks are without specialties and are referred to as "non-designated personnel". All personnel in ranks E-4 to E-9 have occupation specialties and are referred to as follows:

Rank	Rank title	Abbreviation
E-4	Petty officer	PO-3
	Third Class	
E-5	Petty Officer	PO-2
	Second Class	
E-6	Petty Officer	PO-1
	First Class	

E-7	Chief Petty Officer	CPO
E-8	Senior Chief Petty Officer	SCPO
E-9	Master Chief Petty Officer	MCPO

Criteria for advancement in all petty officer ranks include Navy-wide competitive written examinations, demonstrated proficiency in assigned duties within the occupation specialty, and a written periodic performance evaluation and recommendation of the commanding officer. All eligible personnel compete for advancement to fill existing vacancies in the total Navy allowance. In other words, advancement in a particular occupation specialty is contingent upon the Navy's requirement for personnel in that specialty as well as demonstrated performance by the candidate.

Selection to CPO, SCPO and MCPO is accomplished by a selection board convened annually by the Chief of Naval Personnel. Candidates who have successfully competed in the Navy-wide examinations have their records placed before the board for consideration. Again, the total number selected in each rank and occupation specialty is based on total Navy vacancies.

Two final requirements for advancement are time-in-service and time-in-rank. Requirements for these are as follows:



Rank	Time-in-service	Time-in-rank
E-9	16 years	3 years
E-8	13 years	3 years
E-7	10 years	3 years
E-6	7 years	3 years
E-5	3 years	1 year
E-4	2 years	9 months
E-3	6 months	6 months
E-2	6 months	6 months

#### Study Limitations

This study compares the distribution of black and Hispanic ethnic groups in ranks and occupation specialties with that of whites. Accurate data on Hispanics in the Navy have been available only since 1976. Prior to that time, they were classified as a portion of other ethnic groups. Most recent data available are for 1982. This study will use 1976 and 1982 data. Additionally, data from the year 1979 will also be included in order to provide a midpoint reference.

Black and Hispanic ethnic groups were selected for the study because they represent the largest minority ethnic groups in the United States. White ethnics were selected as a basis for comparison of treatment. Together, males of these three ethnic groups comprise over 90 percent of the total enlisted personnel.

Hispanics in the Navy are slightly outnumbered by Filipinos (14,114 to 19,241 as of September 30, 1982). Filipino nationals, however, are not differentiated from Filipino-Americans. Due to this confounding factor, and the relatively small number of Filipino-Americans, this ethnic group will not be included in the study. Ethnic identity is based on self-selection to that particular category by Navy personnel. The term "ethnic group" will be used to identify all ethnic and racial groups in the study for purposes of clarity and brevity.

This study is limited to male white, black and Hispanic active-duty enlistees in the regular Navy. Examination of the treatment of female Navy personnel, while an important topic, requires a different theoretical approach and is considered beyond the scope of this study.

All enlistees in ranks E-4 to E-9 have occupation specialties while many in the lower ranks do not. For this reason, only personnel in ranks E4-E9 will be used in this study.

#### Summary of Research Objectives

This study uses the Navy as an example of an ideal type complex organization because of the precise nature of hierarchical rank and occupation specialties in the Navy as compared to private sector organizations. Affirmative action is used as an example of an organizational goal and a



means by which the organization is attempting to adapt to changes in the environment. The distribution of black and Hispanic male enlistees in ranks and occupation specialties is compared to the white bench mark in order to evaluate the effectiveness in achievement of organizational goals.

This research will attempt to accomplish the following objectives:

1. Describe the changes in the distribution of white, black and Hispanic ethnic groups in ranks and occupation specialties between 1976, 1979 and 1982.
2. Determine the degree to which minority group advancement and occupational placement is affected by the cohort of qualified candidates for advancement, minorities in discretionary positions, and practices which exclude minorities from core-technology occupations.
3. Identify some general principles which might account for the distribution of minorities in complex organizations.

### Overview

Chapter II reviews the literature on organizational effectiveness and organizational goal accomplishment, affirmative action research, and relevant research on military occupational placement and promotion. It also introduces analytical models which are used to guide this

study. Chapter III identifies the sources of data for the study and outlines the methods and statistical procedures used in the study. Chapter IV presents the research findings. Chapter V contains the conclusions and possible policy implications of the findings.

## CHAPTER II THEORETICAL CONSIDERATIONS

### Organizational Effectiveness and Organizational Goals

#### Organizational Effectiveness

Organizational effectiveness literature is plentiful and can be summarized rather easily: there is little agreement as to what organizational effectiveness is or how it can be measured.

Parsons (1956) views organizational effectiveness as three sets of decisions which determine how fluid resources are brought to bear on the process of goal implementation. The first two sets of decisions, policy and allocative, are concerned with what resources should be allocated and to whom in the organization they should be assigned. The third set of decisions, integration decisions, are concerned with the morale and effectiveness of the organization.

Caplow (1964) identifies four variables for measuring organizational effectiveness: stability, or the degree to which the organization maintains its structure; integration, or the ability of the organization to control internal conflict; voluntarism, the morale of the organization; and, achievement, the overall output of the organization.

Etzioni (1961) suggests that organizational effectiveness is dependent on the organizational goals. That is, the organizational goals determine the organizational structure, and the most effective organizational structure is that which maximizes the voluntary compliance of members of the organization.

Kanter and Brikerhoff (1981) point out that criteria for and assessment of organizational effectiveness vary with perspective. Using the Navy as an example, effectiveness of the Navy would be measured very differently if it were viewed from the points of view of the society in general, the individual sailor, or the senior officers. From the perspective of society in general, effectiveness might be measured as the degree to which the Navy was successful in protecting society. From the point of view of individual sailors, effectiveness might be measured in terms such as fairness of treatment and job satisfaction. Senior naval officers might measure effectiveness in terms of effective utilization of fiscal, material and human resources, or continuity with tradition.

Kanter and Brikerhoff (1981) also divide measures of organizational effectiveness into three categories: (1) effectiveness of goal or task accomplishment, (2) effectiveness in adaptation to the environment, and (3) effectiveness of organizational structure and process.

Because of their interrelationships, it is difficult to isolate and operationalize the above measures of organizational effectiveness. For example if, as is the case in this study, the achievement of affirmative action goals is accepted as a measure of organizational effectiveness, it is also a measure of the Navy's adaptation to the environment. That is, Navy affirmative action goals were established to address changes in the demographic composition of the military age population and to adapt to changes imposed by political and legal developments in intergroup relations. The achievement of affirmative action goals will also affect the organizational structure and process in that recruiting more minorities into the Navy will affect morale, job satisfaction and occupational mobility of both majority and minority members already in the Navy.

Yuchtman and Seashore (1967) argue that the assessment of organizational effectiveness through goal achievement has methodological and conceptual problems. They point out that the goal achievement approach assumes (1) that complex organizations have goals toward which they are striving and (2) that the organizational goals can be identified empirically. They also point out that the goals prescribed by top management may differ from the goals of others in the organization, and may also not actually reflect the goals derived from the actual functioning of the organization.

The problem with ambiguity and multiplicity of organizational goals has been discussed by other researchers (Berk, 1966; Goodman and Pennings, 1977; Perrow, 1970; Rhenman, 1967).

Affirmative action offers an excellent subject for research since it is a clearly articulated goal which is promulgated in writing to all levels of the organization. As such, it overcomes the a major portion of the methodological problems pointed out by Yuchtman and Seashore (1967). Further, affirmative action is also a direct measure of the organization's attempt to maximize the acquisition and utilization of scarce human resources from the environment.

### Affirmative Action

#### Background

The early 1960's saw a resurgence in consciousness concerning inequality of minorities in the United States. The term "institutional racism" first appeared in the literature in 1967 (Hamilton and Carmichael, 1967). Social scientists and social activists began to move their focus from personal forms of discrimination to institutional forms, particularly forms of discrimination in employment. It was realized that passive non-discrimination would not adequately remedy institutional forms of discrimination (Feagin and Feagin, 1978). The federal government required



contractors to take "affirmative action" to ensure that minorities were employed and treated without regard to race, creed, color, religion or national origin. Executive Order 10925 of 1961 directed positive measures for the elimination of any discrimination, direct or indirect, which currently exists in the federal government (Benokratiss and Feagin, 1978). The Civil Rights Act of 1964 prohibited discrimination in programs receiving federal assistance and established the Equal Employment Opportunity Commission. By 1972 Executive Order 11246 required affirmative action programs of government agencies including the military and of all federal contractors.

The Department of Defense (DoD) requires heads of activities to be responsible for equal opportunity in their respective jurisdictions and requires the armed services to formulate, maintain and carry out affirmative action plans which establish quantifiable good faith goals, timetables and accountability in personnel management (Department of Defense, 1976).

#### Affirmative Action in the Navy

Prior to 1971, the Navy had no service-wide program specifically designed to address racial discrimination. In January 1972, the Navy began its first effort at increasing racial awareness throughout the service. The initial program was in response to a DoD requirement that all

services conduct a minimum of 18 hours race relations training for all personnel.<sup>1</sup>

By 1974 the vast majority of petty officers and officers in the Navy had received racial awareness training, and Phase II of the Equal Opportunity Program began. Designed to build on the increased racial awareness of the Phase I program, Phase II is now mandatory for all Naval commands. Each command is required to conduct an assessment of the equal opportunity climate of the command and to develop an Affirmative Action Plan (AAP) which addresses problem areas identified in the assessment. The command is reassessed and the AAP revised every 18-24 months. External consultants, Equal Opportunity Program Specialists, are assigned to assist the command in the assessment, development and revision of its AAP.

Command AAP's are designed to accomplish the following:

-----

1

The Navy race relations program became known as "Phase I" and consisted of the following:

1. UPWARD (Understanding Personal Worth and Racial Dignity) seminars which provided 20 hours of racial awareness instruction to senior enlisted and junior officers.
2. Executive Seminars which provided training primarily to executive and commanding officers and department heads (second echelon managers).
3. Flag Seminars which were attended by flag officers (Admirals) and their senior staff officers.
4. Entry level training conducted at recruit training centers, Officer Candidate School and the Naval Academy.



1. Establish plans and procedures to provide non-rated personnel with opportunities to obtain an occupation specialty commensurate with demonstrated ability and desire.
2. Provide for minority representation on those boards and committees which affect the advancement and career development of all personnel.
3. Ensure that all personnel are familiar with the provisions of Navy sponsored education programs.
4. Ensure that there are formal policies promulgated for advancement available to all personnel.
5. Ensure that general administrative and support duties outside of a specific occupation specialty are rotated fairly among all personnel.
6. Provide equal opportunity training for all personnel in their command.

Naval commanders must provide a copy of the AAP to their immediate superior in command for review and approval.

Guidelines for an effective AAP are characterized by the following:

1. It addresses specific actions, the completion of which is measurable.
2. It sets realistic but challenging goals.
3. It is based on accurate diagnosis of equal opportunity issues in the command.
4. It supports the objectives of higher authority.

In summary, the goal of equality of occupational placement and advancement in the Navy is achieved through affirmative action plans promulgated at each echelon of command (Chief of Naval Operations, 1978).

### Military Occupational Placement and Advancement Research

Research conducted on military personnel placement and advancement can be summarized in three basic categories:

1. Studies which focus on individuals' satisfaction with the military and reasons for entering, leaving and reenlisting. These studies employ survey or interview methods and are generally based on self-reported attitudinal data (Blandin and Morris, 1982).
2. Studies of the effects of changes in the civilian economic conditions upon military enlistments, reenlistments and retention. These studies generally use Department of Labor data, large sample sizes and focus on behavior rather than attitudes (Ghazalah, 1979; Cowin, 1980).
3. Studies on the effects of organizational practices such as the use of the Armed Services Vocational Aptitude Battery (ASVAB), technical training school requirements, etc. which may affect occupational placement (Novaco et al., 1979; Youngblood, 1980).

There has been little research which compares the occupational placement of various ethnic groups in the

military. The principal studies in this area are those done by Butler (1976a, 1976b) and Nordlie et al. (1975).

Butler (1976a) in a study of trends in correlations between race and rank in the military from 1962 to 1973 found there was a negative correlation between percentage blacks and enlisted rank. That is, the higher the rank, the lower the percentage of blacks in it. In the Army, this trend went from  $-.64$  in 1962 down to  $-.34$  in 1973. Correlations for the Navy, Marines and Air Force suggested more discriminatory racial distributions than that of the Army,  $-.70$ ,  $-.78$  and  $-.82$  respectively in 1973. Butler also found that, in the Army, blacks were overrepresented in non-technical occupations and found that there was no change in the trend of this distribution between 1966 and 1972. When the effects of mental ability (as measured by AFQT score) was controlled, the inequitable rank and occupation specialty distributions remained, as did the trend of representation between 1966 and 1973.

Butler (1976b) in a study of promotion rates of black and white Army personnel found that blacks in ranks E4-E9 took longer to make their current rank than did their white counterparts. When AFQT was controlled, whites still made rank faster than did blacks.

When the variable of education was controlled, Butler found that, with one exception, whites were promoted faster than blacks. The exception was for ranks E7-E9 where blacks

and whites with high education (some college, or college education) took equal time to make their current rank.

Butler also controlled for types of occupation specialties and found, as one would expect, both blacks and whites in technical occupations were promoted faster than those in non-technical occupations. However, with one exception, blacks in both technical and non-technical occupations were promoted more slowly than whites. The one exception was blacks in ranks E7-E9 in technical occupations, who were promoted at the same rate as whites.

Butler also found interesting within-rank variation in his data. Whites with high AFQT scores were promoted faster than whites with low AFQT scores. The situation for blacks, however, was reversed; blacks in the low AFQT category were promoted faster than those in the high category.

In his conclusion, Butler (1976b:17) stated:

It is not sufficient to explain inequality in the Army, vis-a'-vis promotions, from a theoretical perspective which is grounded in universalistic standards. In other words, little support is given by the data presented for the argument that racial inequality is to be explained by the failure of blacks to meet universalistic criteria. Such an erroneous argument, which is grounded in some of the institutional perspectives, implicitly or explicitly posits that whites generally are more qualified than blacks for attainment of high positions in the Army. Moreover, the 'unqualified blacks' supposition fosters the equally erroneous view that what is referred to as institutional racism operates without the racist actions of real-life individuals.

Segal and Nordlie (1979) and Miller and Ransford (1978) reviewed Butler's data and differed in varying degrees with

his findings. Segal and Nordlie (1979:141) note problems in Butler's aggregation of AFQT scores and education variables which they consider may exaggerate the extent of discrimination on the basis of ascription by incorrectly assuming that achievement has been controlled. Miller and Ransford (1978:68) disagreeing, argue that Butler did not go far enough in his analysis.

When we rearranged all of Butler's tables, the regularity that always came through clearly was that the black disadvantage in promotion time to E5-E6 was more pronounced for those with the most to offer the Army. Namely, higher AFQT scores, higher education and greater technical skills.

Miller and Ransford also point out that Butler's finding an organization rewarding whites who possess desirable qualities such as high AFQT score and education while punishing blacks who have the same qualities is consistent with other research on women in organizations (Miller et al., 1975).

Nordlie et al. (1975) in a study of Army occupational placement and promotion from 1962 to 1973 found that blacks were progressively underrepresented in higher enlisted ranks, particularly ranks E8 and E9. He also found that blacks were overrepresented in infantry, gun crews, supply, service, administrative, and medical occupation specialties and underrepresented in electronic, craftsman, communication, intelligence, and other technical occupation specialties.



Nordlie lacked data to control for qualifications required for various occupation specialties. As a result, it is not possible to determine to what extent the racial differences found in occupational placement were due to the inability of blacks to qualify for high-skill occupations and to what extent the differences were due to racial discrimination.

Both Butler's and Nordlie's research, despite the methodological difficulties and differences in interpretation of findings, still strongly suggests that, in the Army, there is differential treatment in occupational placement and promotion based on race even after factors of human capital such as education and aptitude are controlled. This study attempts to extend knowledge of organizational behavior and theory by advancing in four ways beyond the works just cited. This study compares the treatment of Hispanic as well as black minority groups; it will focus on the Navy rather than the Army; it will control for qualifications of occupation specialties; and, in its timing and emphasis, it will explore the effects of affirmative action programs in the Navy.

The statistical analysis will be conducted with procedures similar to those used by Butler and Nordlie. Use of these statistics will permit comparison of the representation of minorities in this study to the findings of Butler and Nordlie.

### Analytical Models

With the exception of Miller and Ransford's attempt to place Butler's findings into a theoretical context, the recent research on occupational placement and advancement in the military has generally been ad hoc, has not been guided by organizational theory, and has not contributed to the development of organizational theory. This lack has left research findings open to differences in interpretation (Hauser, 1978). While the data suggest that there are differences in treatment based on ethnicity, the literature offers no middle range theories or analytical models which can be used for generalizing from the research findings. This study proposes three models to analyze the representation of minorities in Navy occupation specialties. These models are not competing attempts to account for shares of the variance in a common dependent variable. Rather, they will provide conceptual frameworks to explain features of the occupational distribution of ethnic groups in a complex organization after implementation of an affirmative action policy. Theory suggests that intra-organizational mechanisms may lead to distortion in policy implementation.

The second and third models look for minority distributions plausibly consequent to such factors. The following sections, in turn, develop each model and derive from it a hypothesis.

Cohort Model

The Navy, as an organization, may have been successful in implementing its affirmative action program. If so, the changes from 1976 to 1979 and from 1979 to 1982 in the distribution of ethnic groups within the occupation specialties and ranks will reflect efforts to move members of minority ethnic groups into higher ranks and into occupation specialties requiring higher qualifications. Remaining ethnic differences in representation could be accounted for by either human capital differences (Becker, 1964) or by a cohort effect (Stinchcombe, 1968). Since this study involves only personnel who have been assigned an occupation specialty, the human capital variable is controlled. That is, while there may be differences in education between the various ethnic groups, all members of the study have met the universalistic mental and educational criteria for the occupation specialties. Thus, whatever differences are found in representation of ethnic groups, particularly in the more senior ranks where the effects of prior civilian education would be minimized, could be attributed to differences in treatment in the Navy rather than to differences in human capital. These assumptions are supported by the findings of Blau and Duncan (1967), Butler (1979) and Miller and Ransford (1978).

Since a minimum of three years time-in-rank is required in ranks E6, E7 and E8 in order to be eligible for the next



higher rank, the E5's by 1976 roughly approximate the cohort eligible for advancement to E6 in 1979. Additionally, the E6's in 1979 approximate the cohort eligible for advancement to E7 by 1982, etc.

The cohort effect influences the distribution of minority ethnic groups in the Navy in that it requires a minimum of 10 to 15 years of service in the Navy to be advanced into senior ranks (E7-E9). Therefore, if there was underrepresentation of a minority in low ranks of certain occupation specialties in the past, there would tend to be underrepresentation of this minority group in higher ranks in those occupation specialties in the present. It follows, then, even if the Navy's affirmative action program were pursued with perfect effectiveness, that the program goals would not be achieved until 10 to 15 years after its initiation. Changes in ethnic representation in senior ranks of each occupation specialty should be predicted by the cohort of qualified members of that ethnic group who are available for advancement.

The cohort model assumes that the distribution of minority petty officers into more highly qualified occupation specialties and higher ranks is limited by the number of qualified candidates in appropriate power positions in the opportunity chain (Hope, 1982a,b; Stewman and Konda, 1983).

Meier (1978) in a study of the achievement of affirmative action goals by state and local government agencies found that, while economic and labor pool constraints were the major factors constraining minority hiring, over 25 percent of the variation in minority hiring was independent of these constraints.

Hall and Saltzstein (1977) in a study of affirmative action programs in 26 Texas cities found that employment of Spanish-surnamed individuals was strongly related to the population characteristics such as size and education level of the Hispanic work force. This was not the case however for blacks, whose employment was more constrained by environmental factors such as the size of the city and the characteristics of the employing agency. These findings suggest that the available pool or cohort of qualified candidates may affect blacks and Hispanics differently.

Finally, Butler's (1976b) findings would suggest that black occupational placement and advancement in the Army is not based on their inability to meet universalistic education and testing criteria, but rather, is based on differential treatment in the military. If this is also the case in the Navy, then the cohort of available candidates for advancement would not offer an adequate explanation of ethnic group differences in occupational placement and advancement.

Cohort model hypothesis. All other factors being equal, those occupation specialties where minorities were overrepresented in lower ranks in 1976 should have a greater representation of minority groups in higher ranks in 1979 and 1982 than do those occupation specialties where they are underrepresented.

### Self-interest Model

Factors other than the cohort of members qualified for advancement could also affect the distribution of ethnic groups in occupation specialties and ranks.

One such factor is internal resistance or intraorganizational power struggles. Individuals in organizations are motivated to protect or enhance their spheres of occupational action (Thompson, 1967). Also, according to Thompson (1967:122).

Individuals in highly discretionary jobs seek to maintain power equal to or greater than their dependence on others.

The Self-interest model would suggest that those occupation specialties with a high percent of whites in senior ranks would move to protect their position and would slow the entrance of minority ethnic groups into that occupation specialty. Further, occupation specialties with a high percent of minorities in senior ranks would tend to increase the representation and mobility of minorities in that occupation specialty. The Self-interest model assumes

resistance to the achievement of organizational goals from enlisted personnel in discretionary positions (ranks E7-E9) who are protecting the interest of people in their ethnic group.

Research on public sector organizations has generally supported the concept that minorities in discretionary positions will act in the interest of members of their ethnic group. Thompson (1976) found that increases in minority representation (passive representation) influences policy in favor of minorities (active representation). Thompson also identified the following conditions under which passive and active representation would be more likely to be linked.

1. When institutions and groups articulate an ideology of minority pride for advancement of minority issues.
2. When minorities in power deal in issues which improve the well being of people in their ethnic group.
3. When minorities in the organization have a high level of association with members of their own ethnic group.
4. When minorities occupy discretionary jobs, especially those jobs in lower echelons.
5. When members of a minority group work in close proximity to one another.

Rosenbloom and Featherstonhaugh (1977) in a study of federal employees found that blacks tended to act in the

interest of other blacks. Davis and West (1978) had similar findings in a study of perceptions of affirmative action among Mexican-American city and county supervisors and middle managers.

Stillman (1974) argues that career military officers and petty officers who achieve discretionary positions have been socialized into a common set of ideals and values regardless of their ethnic identity, and will therefore not act in the interest of members of their own ethnic group. Stillman (1974:227) states:

While increasing cultural diversity will be apparent in the armed services, the military officers and enlisted men who rise to the top ranks now and in future years will tend to be those lifetime careerists who most closely emulate the central professional ideals and values of the service.

The Self-interest model will test whether members of minority ethnic groups act in the interest of members of their own ethnic group by assisting them to enter their occupation specialties.

Stouffer et al. (1949) found a correlation between perception of promotion opportunity and social groupings. Soldiers who were considered in the in group by their peers were perceived to have higher promotion opportunities. Other studies have found that social characteristics of class, religion, and region of origin in the United States were related to military promotion (Janowitz, 1960; Mills, 1959; Coats and Pellegrin, 1965). These studies found that

southern upper-class white Protestants tended to be overrepresented in senior officer ranks.

Self-interest hypothesis. All other factors being equal, ethnic representation in discretionary positions (ranks E7-E9) in 1976 should predict proportional representation in ranks E4-E9 in 1979 and 1982.

### Core Technology Model

The third model suggests the organization itself may have put priority on goals other than equality of assignment. This model views the organization in terms of its core and peripheral technologies.

Thompson (1967:19 states):

Under norms of rationality, organizations seek to seal off their core technologies from environmental influences.

This model suggests that occupational specialties which represent the core technologies of the Navy are traditionally white and that personnel in power positions (policy making officers) in the organization would tend to maintain them as such. Therefore, these officers would resist accepting minorities into core sectors to a greater degree than into occupations in non-core or peripheral technologies.

Research on the distribution of minority groups in core and peripheral occupations in organizations is limited, and the findings have been interpreted differently. For



example, Coakley (1978) in a study on the distribution of blacks and whites on sports teams, found that blacks were underrepresented in central positions (baseball pitchers and catchers; football quarterbacks, centers and guards) and overrepresented in peripheral positions (baseball outfielders; football running backs and flankers).

Coakley's findings conflict with data on black representation in the Army. During the Vietnam era, blacks in the Army tended to be overrepresented in combat occupations, even when the variable of AFQT was controlled. These data were variously accounted for as being due to class rather than to race factors (Moskos 1976) and due to race discrimination (Butler, 1976b). Nonetheless, combat arms represent the core technology of the Army, and there is some evidence to suggest that, in the case of the Army, minorities may be overrepresented in core occupations rather than underrepresented.

Two problems have hampered research into the distribution of minorities in core and peripheral occupations in the military. The first is that core technology occupations often require higher skill levels than do peripheral occupations. Therefore, a control for the difficulty of each occupation is needed. Data which would permit this were often not available. The second problem is that categories of core and peripheral technologies are not precise. Divisions such as "combat arms" and

"support" comprise numerous occupation specialties and do not contain occupations which exclusively represent core and peripheral technologies. Combat arms contains some occupation specialties which could be considered peripheral technology while support occupations contain some occupation specialties which could be considered core technology.

Both of the problems in categorizing military occupations have been due in part to a lack of adequate data. The data available for this study will permit the categorization of all Navy occupation specialties into discrete categories of core and peripheral technologies.

Core technology model hypothesis. All other factors being equal, minority groups will be overrepresented in peripheral occupation specialties and underrepresented in core technology occupation specialties.

### Summary

Review of the literature on organizational effectiveness and affirmative action suggests that affirmative action will provide an excellent subject for research on organizational behavior in goal accomplishment. Research on the distribution of minorities in the military, principally that done by Butler and Nordlie, has been hampered by a lack of data. As a result, the research has not been able to examine the effect of affirmative action on Hispanics in the military, nor has it been able to contribute to organizational theory.



This study attempts to extend knowledge of organizational behavior and theory and also to fill some gaps in research on the military by

1. comparing the treatment of Hispanic as well as black minorities.
2. focusing on the Navy rather than the Army, where the recent research on the distribution of minorities has been done.
3. using a theoretical framework which will allow the findings to improve for the analysis of other complex organizations and contribute to organizational theory.

## CHAPTER III METHODS

### Data Sources

Data for this study were obtained primarily from the Navy-wide Demographic Data Base. These data identify the occupation specialty, rank, sex and ethnic identity of the entire active duty population for the years 1976, 1979, and 1982. These years were selected because (a) 1976 represents the first year accurate data on Hispanics were available and also approximated the time affirmative action programs were firmly established throughout the Navy, (b) the year 1979 provides a midpoint reference between 1976 and 1982, and (c) 1982 represents the most recent data available.

The data have the advantage of representing the entire population of the Navy and therefore do not require any statistical procedures involving the estimation of population parameters. That is, whatever differences are found between ethnic groups will be significant in that they are population differences.

The data do, however, have major limitations which should be mentioned. First, the data are aggregated as of the end of the fiscal year (September 30). Therefore, conclusions about the behavior of individual members of the

various ethnic groups cannot be made without severe reservations. Secondly, since the population does not represent a closed system, conclusions based on the analysis of cohorts must be made with caution. For example, the minimum time for advancement from rank E-7 to E-8 is three years. If the population represented a perfect closed system, the entire cohort of E-7's in 1976 would appear as E-8's in 1979. Regretably, as with any cohort data, there are confounding effects (Glenn, 1977). First, all members of the population are not promoted with their cohort. Some occupation specialties have faster advancement rates than others. Also, within occupation specialties, poor performers are advanced more slowly than superior performers. Secondly, people retire or leave the Navy at the end of their enlistments, i.e., exit at various levels of the ladder. Finally, a few people are recruited into the Navy in ranks E-7 and E-8, and a smaller number of people are reduced in rank for disciplinary reasons.

While all of the above factors tend to confound the analysis of the data and limit the statistical procedures that can be used, the data source is nonetheless rich and suitable for analysis.

The second source of data is the Navy Enlisted Career Guide 1980-1981. This publication gives job descriptions for each of the Navy occupation specialties and was used to determine whether occupations represented core or peripheral technologies.

The third source of data is the Navy Recruiters' Manual (COMNAVCRUITCOM, 1979). This manual provides information to recruiters regarding the qualifications required for entrance into the various Navy enlistment programs. The data from the manual used in this study are aptitude test scores required for acceptance into the "A" schools for each occupation specialty. These scores represent the minimum qualifications for entry into each occupation specialty and will therefore permit an hierarchical ordering of occupation specialties by their degree of qualification.

The data sources for this study permit the identification of the white, black and Hispanic enlisted population of the Navy by occupation and rank. Additional sources of data permit the categorization of occupation specialties by their technology (core and peripheral) and aptitude level of qualification.

#### Identification of the Population

As stated previously, the data represent the total male enlisted population of the Navy for the years 1976, 1979 and 1982. From this population, only white, black and Hispanic ethnic groups were selected for study. As stated in Chapter I, the study of the treatment of females in the Navy is considered beyond the scope of this study. Accordingly, females were deleted from the study population.

Additionally, seven construction occupation specialties (Sea Bees) and three Petty Officer occupation specialties were deleted from the population. The Sea Bees were deleted because they are organizationally an autonomous unit and therefore do not represent traditional Navy occupations. The Petty Officer occupation specialties of Legalman, Master-at-Arms, and Navy Counselor were deleted from the population because these occupations are not open to incoming recruits but, rather, obtain personnel from other occupations.

After deletion of the above occupations, the total 1982 E1-E9 population was 403,328 personnel. The population in ranks E4-E9 contained 88 occupations and 24,935 individuals.

The term "total population" in this study refers to white, black and Hispanic male Navy enlistees in ranks E1-E9 on full-time active duty. The term "petty officer population" refers to members of this population in the 88 occupation specialties described above who are in ranks the spec E4-E9.

### Specification of Variables

#### Qualification

Qualification for Navy occupation specialties is based primarily on civilian education and scores on a battery of aptitude tests (Armed Services Vocational Aptitude Battery, ASVAB). The more technical occupations generally require a

high school diploma and superior achievement on the test battery, while non-technical occupations require less than a high school diploma and average or below test scores. The ASVAB tests aptitude in the following subjects (COMNAVCRUITCOM, 1979).

Subject	Abbreviation
General Science	GS
Arithmetic Reasoning	AR
Paragraph Comprehension	PC
Numerical Operations	NO
Coding Speed	CS
Auto and Shop Information	AS
Mechanical Comprehension	MC
Electronic Information	EI

Various combinations of subjects are used to determine qualifications for occupation categories. Occupation specialties are grouped into four general categories. These are:

1. General Technical (GT)
2. Mechanical (MC)
3. Electronics (EL)
4. Clerical (CL)

Qualifications for each of these categories are based on combinations of ASVAB subject scores. For example, General Technical occupations require a combination of Paragraph Comprehension, General Science, and Arithmetic Reasoning.

Electronics requires a combination of Mechanical Comprehension, Electronic Information, General Science and Arithmetic Reasoning. Occupation specialties within each general category require minimum scores in order to qualify for a particular occupation specialty. For example, A GT score of 90 is required to qualify as a Quartermaster, while a score of 110 is required to qualify as a Postal Clerk. An electronics score of 90 is required to qualify as an Aviation Ordnanceman, while a score of 218 is required to qualify as an Aviation Fire Control Technician.

The ASVAB subject scores are standardized with mean 50 and standard deviation 5. Therefore the average standardized score may be obtained by dividing the score required for each occupation specialty by the number of subject tests required. Average standardized scores required to qualify for occupation specialties ranged from 45 for Mess Management Specialist to 55 for Journalist, Data Processing Technician and several other occupation specialties. The occupation specialties were placed into one of three categories based on the average standardized score required to qualify for the occupation specialty. Occupations with scores between 45 and 49 were categorized as "low qualified" occupations, and those which required average standardized scores of between 49.1 and 51.7 were classified as "medium qualified" occupations. Occupations which required average standardized scores greater than 51.7



were classified as high qualified. This categorization resulted in three fairly equal groups with regard to both occupation specialties and personnel. There were 22 low qualified occupations (N=86,003), 29 medium qualified occupations (N=73,948), and 37 high qualified occupations (N=86,948).

### Technology

The main mission of the Navy is rather straightforward; to control and protect the seas. The Navy carries out this mission by operating ships and aircraft. Core technology occupations, therefore, are those which are primarily involved with the operation of ships and aircraft. For this study, core technology occupations are defined as those occupations which involve the operation of propulsion, detection and weapons systems equipment aboard ships and aircraft. Examples of core technology occupation specialties are Machinest's Mates, who operate shipboard propulsion machinery; Aviation Anti-submarine Warfare Operators and Sonar Technicians, who operate aviation and shipboard detection equipment; and Gunners' Mates, who operate shipboard weapons systems.

Core support occupations are those occupation specialties whose primary job function is to maintain and repair the equipment directly associated with the operation of ships and aircraft. Examples of core support occupation

specialties are Electronics Technician, Machinery Repairman, and Aviation Structural Mechanic.

Support occupations are those occupations which provide personnel, logistic, maintenance, and administrative support to the operating forces. Examples of support occupation specialties are Journalist, Ship's Serviceman, and Hospital Corpsman.

The Navy Enlisted Career Guide 1980-1981 gives a detailed job description of each of the major Navy occupation specialties. This publication was used to classify each of the occupation specialties into core, core support and support technology categories according to the criteria previously described. This classification resulted in 39 core (N=110,910), 22 core support (N=81,207), and 27 support (N=54,799) occupation specialties.

### Statistical Procedures

#### Difference Indicators

The statistic used to summarize and describe the distribution of blacks and Hispanics in the population must meet four criteria:

1. It must be sensitive to differences in the relative size of the groups being compared.
2. It must be easily interpretable.
3. It must be sensitive to changes in the size of the population over time.

4. It must compare the representation of a particular group against a standard.

An accepted standard against which to compare observed distribution of a group is the random distribution of that group within the population (Agresti and Agresti, 1979). This method assumes that all ethnic groups are randomly distributed throughout the population. As an example, if blacks comprised 6 percent of the Navy petty officers and were randomly distributed in ranks and occupations, one would expect blacks also to comprise 6 percent of each rank and occupation specialty.

Nordlie et al. (1975) describe a Difference Indicator (DI) which is based on the assumption of random distribution. The DI is calculated as follows:

$$DI = (Actual\ Number / Expected\ Number \times 100) - 100$$

Where: Actual Number = The number of members of a particular ethnic group in the category of interest.

Expected Number = The number of members of the ethnic group of interest one would expect to find if members of that group were randomly distributed throughout the population.

The Expected Number is derived by multiplying the percent of the minority group in the category of interest by the total population in that category. For example, in 1982 there were 11.48 percent black male petty officers (ranks E4-E9) in the Navy. If this group were randomly distributed

with regard to rank, one would expect to find 11.48 percent blacks in each rank and in each occupation specialty. There was a total of 9,108 black, white and Hispanic petty officers in rank E7 in highly qualified occupation specialties. Therefore, the expected number of blacks in highly qualified occupations in rank E7 would be 11.48 percent X 9,108 = 1,045. The Expected Number is divided into the Actual Number to form a ratio. This ratio is then multiplied by 100 to form a more easily interpreted percent. Finally, 100 is subtracted from the result so that, when the actual and expected numbers are equal, the DI equals zero. The DI is interpreted as the percentage which a particular group is over or underrepresented from random distribution in the category of interest. Continuing with the above example, there were 365 black E7's in highly qualified occupations in 1982. The DI for this category is

$$DI = (365 / 1,046 \times 100) - 100$$

$$DI = -65$$

The selection of the base line population has a strong effect on the expected percentage and the resulting DI. Both Butler (1976a) and Nordlie et al. (1975), in their studies of black enlisted rank distribution in the Army, used as the expected percentage the percent blacks in the enlisted population of the Army. Minority distribution can generally be expected to be biased downward. The more inclusive the population source of expected percentage, then, the less

measured discrimination. In the example of the black E7 cited above, the DI may vary from -65 percent to -33 percent, depending on the base population selected.

For general descriptions of the total population and petty officer population, this study will use the percent of the minority group of interest in the total population of the Navy to derive the expected percentage. In testing the three models, the percentage of the minority group of interest in each rank and level of qualification of occupation will be used as the expected percentage.

#### Change Indices

The DI describes the representation of a particular ethnic group at a given point in time. Some indication of changes between points of observation can be determined by examining the trends in the DI's. However, additional statistics which more specifically describe changes in the distribution of the minority groups between 1976 and 1982 would be useful. Two statistics will be used for this purpose. The first will describe changes in each of the minority groups in specific occupational categories relative to changes in the white population in that category. The second will describe changes in each minority group within a specific occupation category relative to changes in the population of that minority group in each level of occupational qualification.

Change in representation index.      The Change in

Representation Index (CRI) is derived as follows:

$$CRI = \left[ \frac{\frac{m82}{w82}}{\frac{m76}{w76}} \times 100 \right] - 100$$

Where m76 and m82 are the number of members of the minority group of interest in a particular rank and occupation specialty in 1976 and 1982 respectively, and w76 and w82 are the number of whites in that rank and occupation for the same years.

The number of members of the minority group of interest in a particular rank and occupation category in 1982 is divided by the number of that group in that category in 1976 to form a change ratio. This ratio is then multiplied by 100 to form a change percentage. Finally, 100 is subtracted from the ratio so that, if there was no change between 1976 and 1982, the CRI would equal zero.

The CRI is interpreted as the percent change between 1976 and 1982 in the composition of each minority ethnic group relative to whites within each rank and category of occupations. For example, in 1976 there were 183 Hispanics and 8,107 whites in ranks E7-E9 in those low qualified occupations where Hispanics were overrepresented in ranks



E4-E6 in 1976 (Cohort Model). In 1982, there were 187 Hispanics and 6,788 whites in the same rank and occupation category. The CRI for Hispanics in this example is

$$\text{CRI} = \left[ \frac{\begin{array}{r} 187 \\ \hline 6,788 \end{array}}{\begin{array}{r} 183 \\ \hline 8,107 \end{array}} \times 100 \right] - 100$$

The CRI of 22.1 percent is interpreted to mean that, relative to whites, Hispanics in ranks E7-E9 increased by 22.1 percent in proportional representation in low qualified occupations where they were overrepresented in ranks E4-E6 in 1976.

Calculating the CRI by comparing each minority group with whites was selected for this study for two reasons. First, the percentage change in the white population provides less distortion than does comparison to the total of whites, blacks, and Hispanics. Secondly, this method is not influenced by changes in one minority group relative to another.

Change in distribution index. The second index which will be used to describe the changes in the minority group population between 1976 and 1982 is the Change in Distribution Index (CDI). The CDI is derived as follows:

$$CDI = \left[ \frac{m82}{M82} - \frac{w76}{W76} \right] \times 100$$

Where m is the number of the minority group of interest in a particular rank and occupation category in 1976, and M is the total number of members of the minority group of interest in a particular level of occupation qualification.

The CDI compares the distribution of each minority group in 1976 with the distribution in 1982 for each level of qualification. The CDI is interpreted as the percent change in the distribution of the minority group of interest within a particular qualification and occupation category. The CDI equals zero when there has been no change in the distribution between 1976 and 1982.

### Analytical Models

#### Cohort Model

If placement into occupation specialties and ranks is determined by the cohort of qualified candidates, then the distribution of this pool of qualified candidates should account for a large portion of the distribution of ethnic groups in the ranks and occupations at the time this cohort was advanced. Or, controlling for qualifications, occupations which have large percentages of a particular ethnic group in ranks E4-E6 in 1976 should have a higher

percentage of members of that ethnic group in ranks E7-E9 in 1979 and 1982 than occupations where that ethnic group is underrepresented in ranks E4-E6 in 1976.

The Cohort model was tested by dividing the occupation specialties in 1976 into two groups. The first group consisted of those occupations where the ethnic group of interest was greater than the mean percentage in ranks E4-E6. The other group consisted of those occupations where the minority group of interest was less than the mean percentage in those ranks. A DI was calculated for each category of qualification for ranks E7-E9 in 1979 and 1982.

The Cohort model hypothesis is supported if the DI for the occupations where the minority group of interest is overrepresented in ranks E4-E6 in 1976 is greater, for each category of qualification, than those occupations where it is underrepresented. The hypothesis is also supported if the CRI and CDI for ranks E7-E9 in the occupation category where the minority group of interest was overrepresented in ranks E4-E6 in 1976 were greater than the occupation category where the minority group was underrepresented.

#### Self-interest Model

If enlistees of a particular ethnic group in highly discretionary positions act in the interest of their ethnic group, then, controlling for qualifications of occupations, those occupations where members of a particular ethnic group

are overrepresented in discretionary positions should increase the representation of that ethnic group at a faster rate than occupation specialties where they are underrepresented in discretionary positions.

Since personnel in ranks E7-E9 are selected by members of a selection board, the criteria of their selection is subject to more subjectivity than is the process for advancement in lower ranks which is based more on universalistic criteria. Further, people in higher ranks fulfill positions requiring leadership and independent action with little or no supervision. For these reasons, ranks E7-E9 are defined as discretionary positions for purposes of this study.

The analysis was conducted as follows: Occupation specialties in 1976 were divided into two categories; one containing those occupations where the minority group of interest was greater than the mean percentage in ranks E7-E9, and one where it was less than the mean percentage. The dependent variable was the DI for ranks E4-E9 in 1979 and 1982.

The hypothesis of the Self-interest model is supported if, for each category of qualification, the DI's in 1979 and 1982 are greater for the occupations where the percentage of the minority group of interest is overrepresented in discretionary positions in 1976 than for those occupations where it is underrepresented.

The hypothesis is also supported if the CRI's and CDI's are greater for the category of occupations where the minority group of interest is overrepresented in discretionary positions than for the category of occupations where the minority group is underrepresented.

### Core Technology Model

This model suggests that the organization protects its core technology from change. If the organization was threatened by the inclusion of minority ethnic groups, then one would expect, when ethnic minorities were included in the organization through affirmative action, they would tend to be overrepresented in occupations representing peripheral technologies and underrepresented in those occupations representing the core technology.

Occupations were categorized according to the job description for each occupation specialty. Each occupation was assigned to either core, core support or support technology categories based on the criteria described in the specification of the technology variable section of this chapter.

The DI's were calculated for each rank and qualification category for the years 1976, 1979 and 1982. The Core Technology model hypothesis is supported if the DI's for the core category, for each category of qualification, are greater than those for core support and

support categories. Additional support for the model is gained if the CRI's and CDI's for core occupations are less than those of core support and support occupations.

### Models and Tests

One model (Cohort) is sensitive to whether the Navy is, through time, accomplishing its affirmative action goals. Two additional models generate hypotheses concerning minority occupational distribution departing from perfect effectiveness in this goal attainment. One of these (Self-interest) presumes distorting pressures by enlisted personnel and the other (Core Technology) imputes distorting action to officers. Between the two, these exhaust the Navy's personnel. Alternative explanations positing internal factors would be confounded with these. Other models concerned with forces outside the Navy are beyond the scope of this study. Still other models would generate predictions not testable with the data available. This study proceeds, in the next chapter, to examine the data with respect to these three models.



## CHAPTER IV FINDINGS

### General

As of September 30, 1976, the enlisted population of the Navy was 399,373. Between 1976 and 1979, the population decreased slightly to 394,251. Between 1979 and 1982, it increased to 403,328. The total increase over this 6-year period was 3,955. These data are contained in Table 1. As can be seen from Table 1, the white and black populations varied considerably between 1976 and 1982. In 1976, whites comprised 88 percent of the population while in 1982 they comprised 83.4 percent. This represents a decrease of 4.6 percent or 15,072 people. During this same period, blacks increased from 8.6 percent of the population in 1976 to 13.1 percent in 1982. This change represents a gain of 4.5 percent or 18,525 people.

Changes in the Hispanic population were slight. Hispanics comprised 3.4 percent of the population in 1976, decreased slightly to 3.1 percent in 1979 and then increased back to 3.4 percent by 1982. This change represents a net increase of 502 people.

Representation of Blacks and Hispanics in the total population by rank for the years 1976, 1979 and 1982 are illustrated in Figures 1 and 2.

Table 1

Total White, Black, and Hispanic  
Enlisted Population of the Navy

Year	Whites		Blacks		Hispanics		Total
	Number	Pct.	Number	Pct.	Number	Pct.	Number
1976	351,600	88.0	34,404	8.6	13,369	3.4	399,373
1979	337,498	85.6	44,701	11.3	12,052	3.1	394,251
1982	336,528	83.4	52,929	13.1	13,871	3.4	403,328
1982-							
1976	-15,072	-4.6	18,525	4.5	502	0.0	3,955

As can be seen from Figures 1 and 2, both blacks and Hispanics tend to be overrepresented in ranks E1, E2, and E3, rather equitably represented in rank E4, and progressively underrepresented in ranks E6 through E9. Trends in representation between 1976 and 1982 are varied. In ranks E7 and E8 blacks tend to be increasing in underrepresentation while the trend for Hispanics in these ranks is constant. The trend for rank E9 seems to also be constant for both blacks and Hispanics.

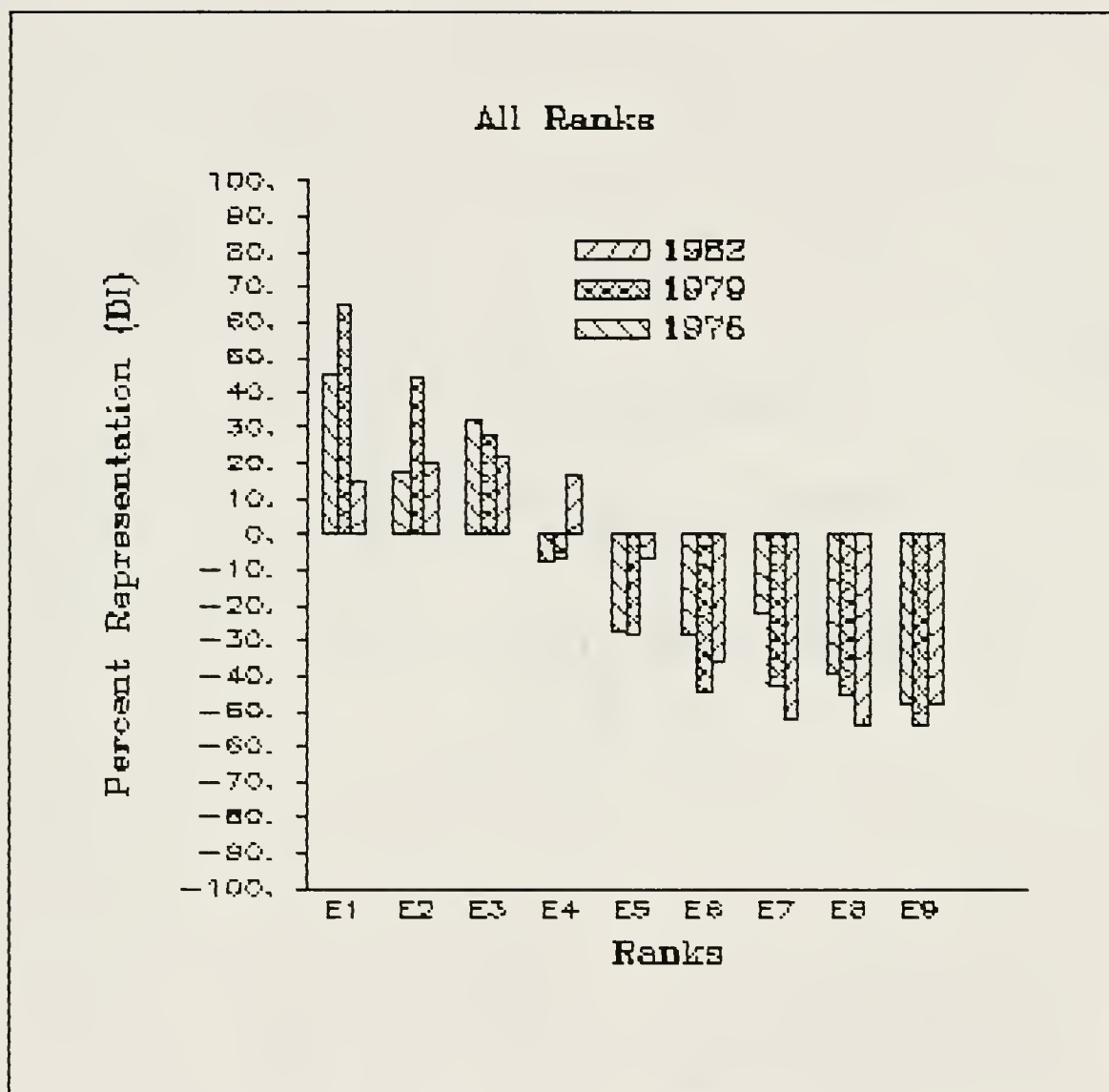


Figure 1  
Total Navy Black Population

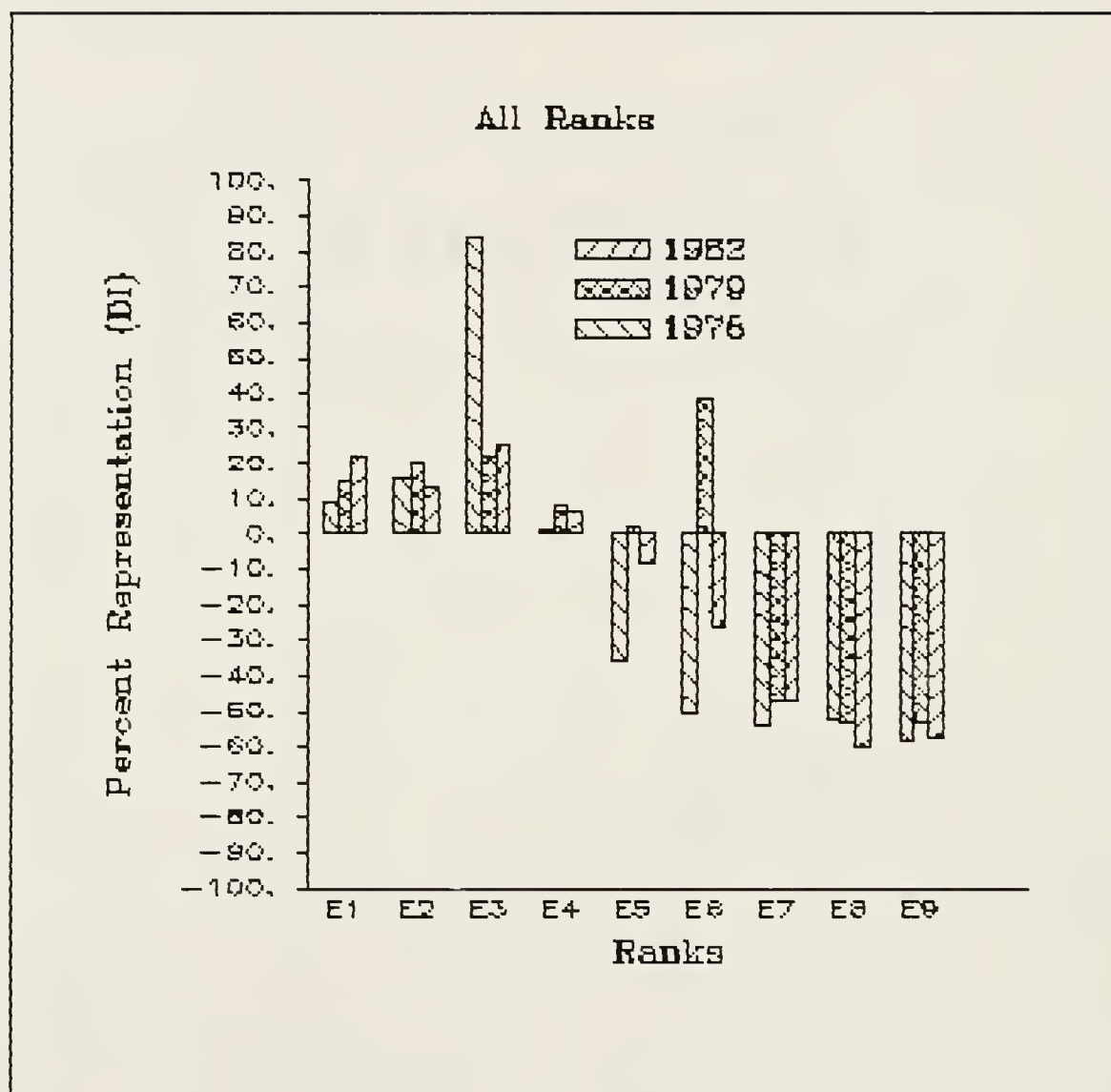


Figure 2  
Total Navy Hispanic Population

### Description of the Petty Officer Population

Examination of the population by qualification of occupation as presented in table 2 reveals some interesting findings. The percentage of whites in all three categories of qualifications has remained quite stable, while the percentage of blacks and Hispanics has markedly increased.

The rank distribution shows wide variation. Figure 3 illustrates the representation for blacks in high, medium, and low qualified occupations. In highly qualified occupations, blacks are underrepresented in all ranks. This underrepresentation generally increased from lower to higher ranks. In medium qualified occupations, the representation of blacks is generally equitable, with a slight tendency toward overrepresentation in higher ranks. In low qualified occupations however, blacks are overrepresented in all ranks. This overrepresentation increases progressively with higher ranks.

Examination of trends of DI's provide accurate information of the percentage changes in the distribution of minorities from random distribution. However, the observer must keep in mind these figures are based on different expected percentages and that actual percentage changes may be much different. The DI represents the percent deviation from random distribution of minorities from an expected percentage. Therefore, a change in the expected percentage



Table 2

Petty Officer Population of the Navy  
by Qualification of Occupation

Highly Qualified Occupations

Year	Whites		Blacks		Hispanics		Total
	Number	Pct.	Number	Pct.	Number	Pct.	Number
1976	77,375	93.7	3,649	4.4	1,558	1.9	82,582
1979	77,155	91.9	4,880	5.8	1,885	2.3	83,920
1982	77,306	88.9	7,403	8.5	2,275	2.6	86,984
1982- 1976	-69	-4.8	3,754	4.1	717	0.7	4,402

Medium Qualified Occupations

Year	Whites		Blacks		Hispanics		Total
	Number	Pct.	Number	Pct.	Number	Pct.	Number
1976	63,401	90.5	5,007	7.1	1,624	2.3	70,032
1979	63,905	88.1	6,650	9.2	1,958	2.7	72,513
1982	62,601	84.6	9,170	12.4	2,117	2.9	73,948
1982- 1976	-800	-5.9	4,163	5.3	553	0.6	3,916

Low Qualified Occupations

Year	Whites		Blacks		Hispanics		Total
	Number	Pct.	Number	Pct.	Number	Pct.	Number
1976	69,035	88.4	6,964	8.9	2,073	2.7	78,072
1979	71,270	86.6	8,492	10.3	2,561	3.1	82,323
1982	71,316	82.9	11,767	13.7	2,920	3.4	86,003
1982- 1976	2,281	-5.5	4,803	4.8	847	0.7	7,931

All Occupations

Year	Whites		Blacks		Hispanics		Total
	Number	Pct.	Number	Pct.	Number	Pct.	Number
1976	209,811	91.0	15,620	6.8	5,255	2.3	230,686
1979	212,330	88.9	20,022	8.4	6,404	2.7	238,756
1982	211,223	85.5	28,340	11.5	7,372	3.0	246,935
1982- 1976	1,412	-5.5	12,720	4.7	2,117	0.7	16,249

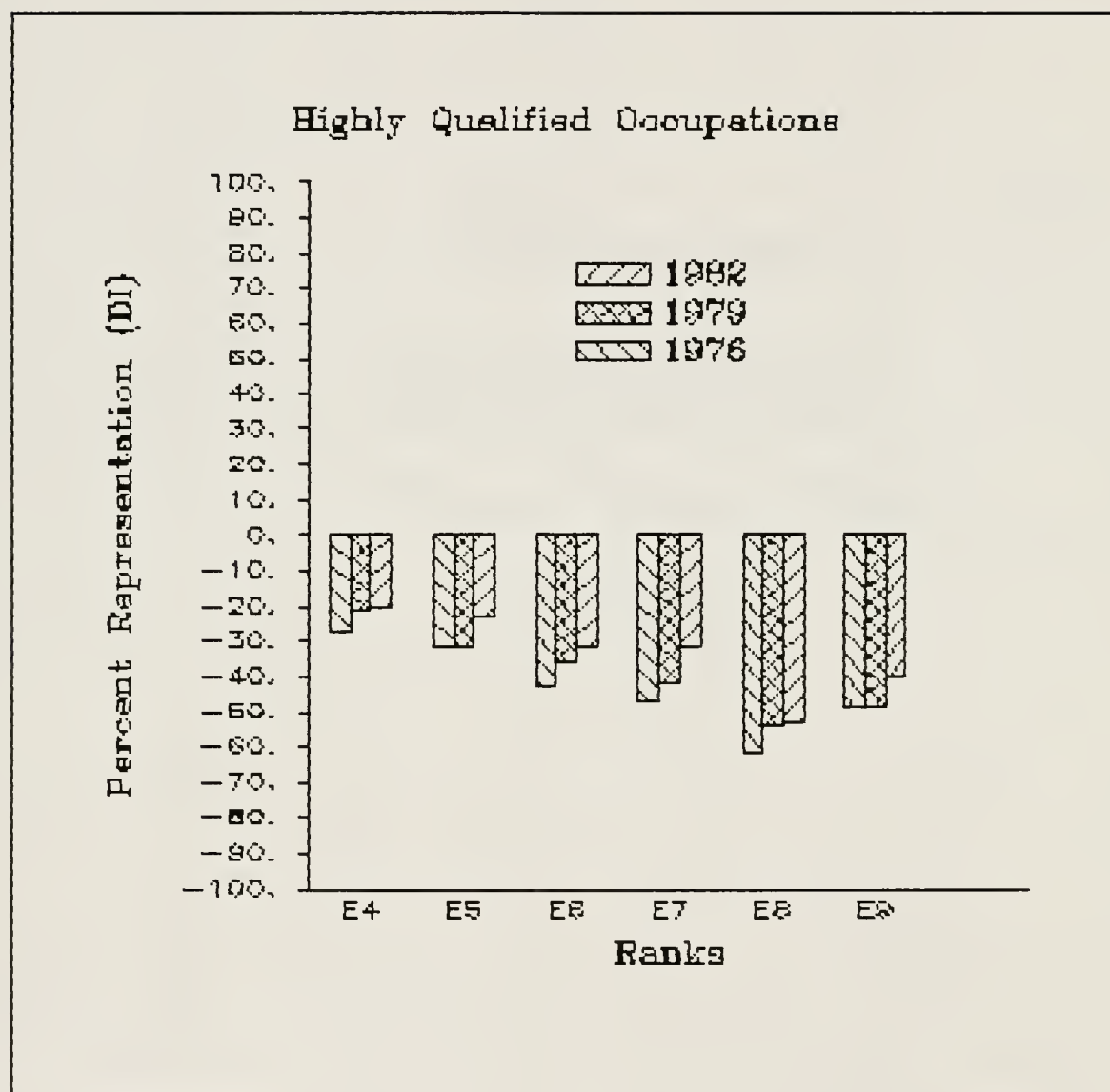


Figure 3

Black Representation by Qualification

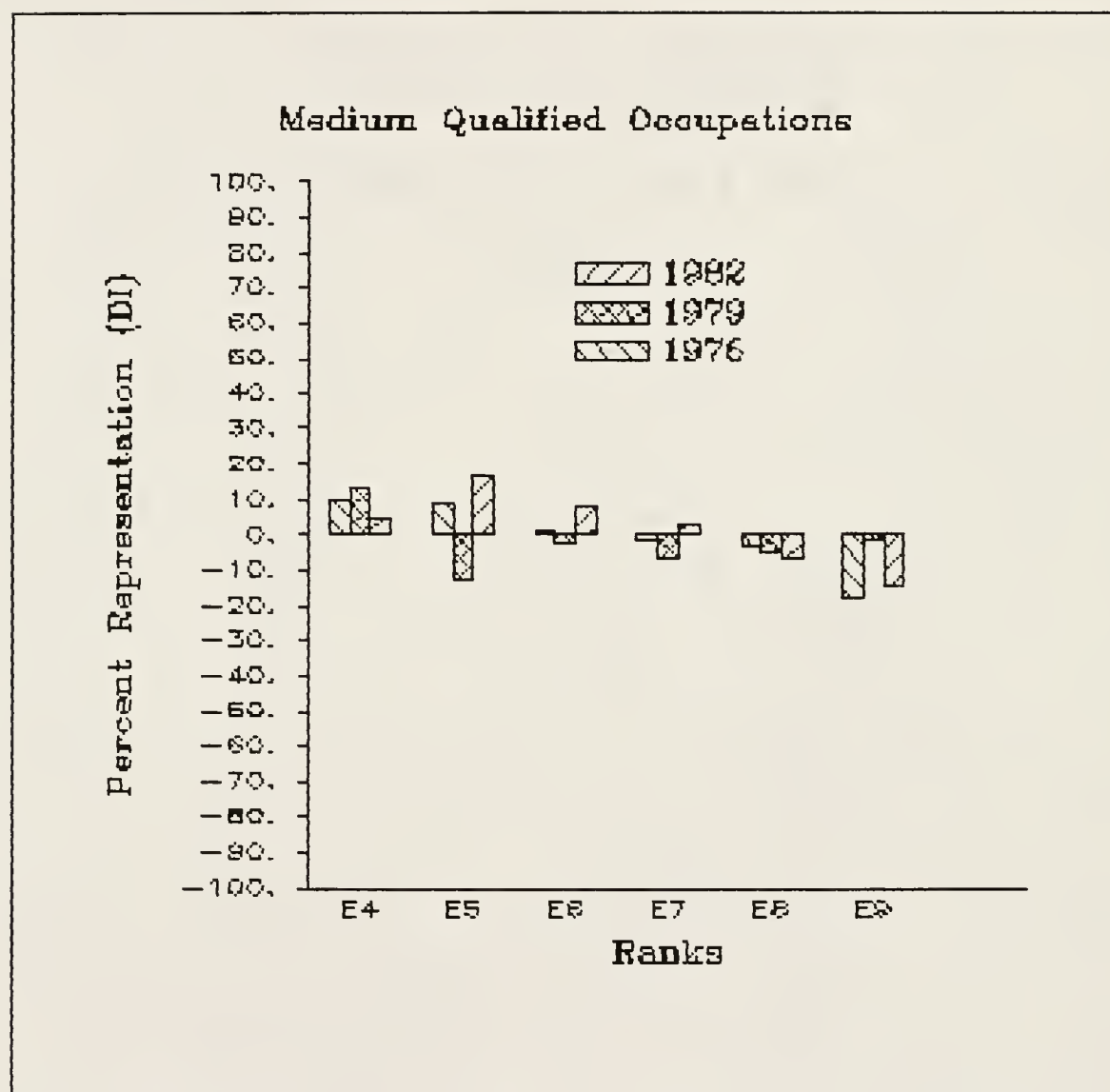


Figure 3--continued.

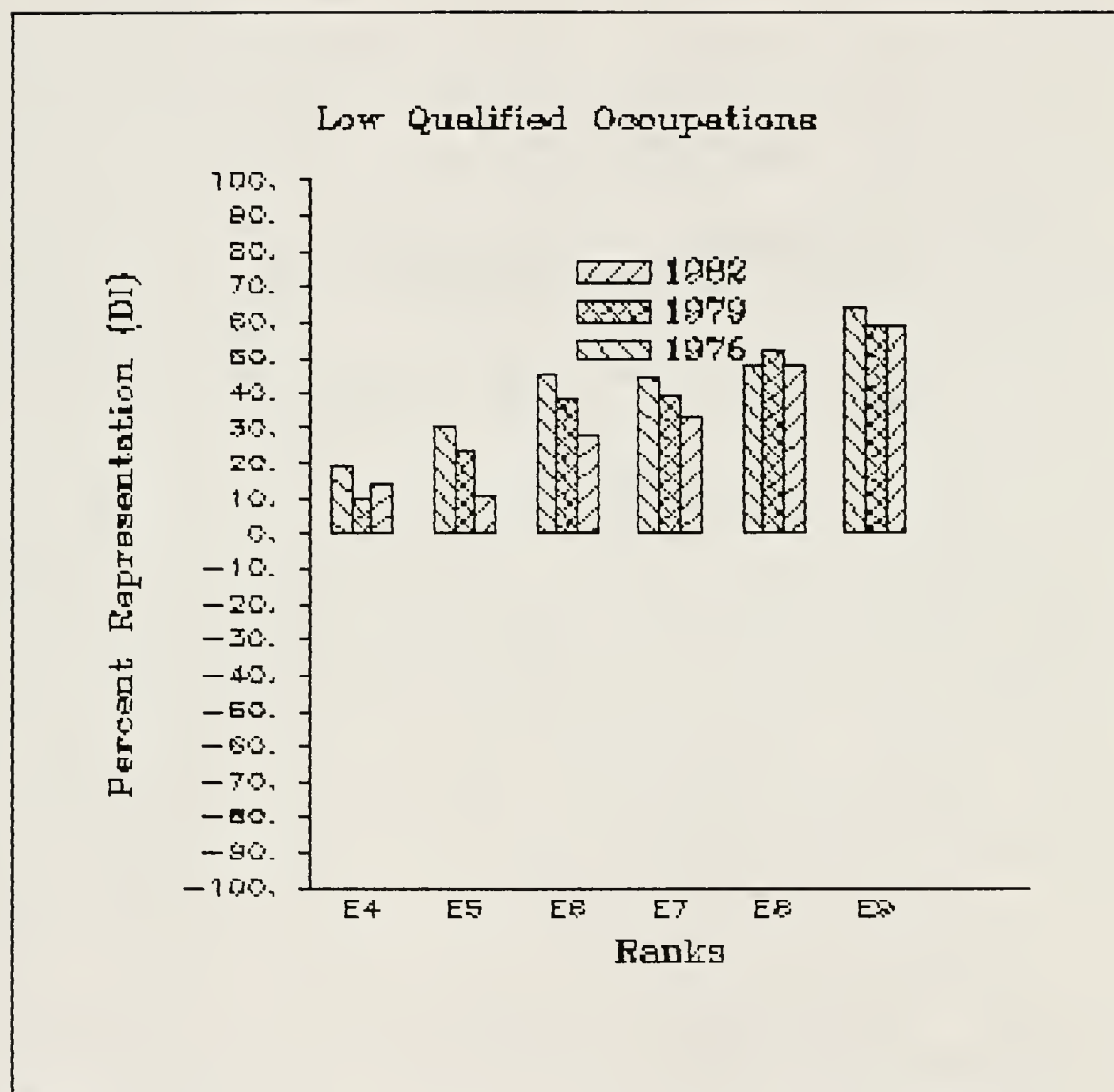


Figure 3--continued.

of minorities between observations would also change the DI. For example, Figure 3 indicates that, in rank E4 in highly qualified occupations, blacks were 28 percent underrepresented in 1976 and 21 percent underrepresented in 1982. These figures are based on the percent of black E4's in the Navy in 1976 and 1982 respectively (8.08 percent and 15.22 percent). That is, if black E4's were randomly distributed, one would expect that, in 1976 and 1982 respectively, 8.08 and 15.22 percent of E4's in highly qualified occupations would also be black. Therefore, even though the number of black E4's in highly qualified occupations more than doubled between 1976 and 1982 (from 3,649 to 7,403) the underrepresentation of blacks in that category was reduced by only 7 percent.

The expected percentages used in this study are contained in Appendix A.

In highly qualified occupations the trend of DI's for blacks has been moving toward equality for all ranks. For medium and low qualified occupations, with the exception of a movement toward equality of distribution in ranks E5-E7 in low qualified occupations, there has been little change in the representation of blacks.

The CRI and CDI provide more accurate indicators of changes that have occurred in the distribution of minorities between 1976 and 1982 than does the examination of trends in DI's. Figure 4 illustrates the CRI's and CDI's for blacks

in high, medium and low qualified occupations. With the exception of rank E7 in medium and low qualified occupations, blacks have increased in representation in all ranks and qualification levels of occupations.

The change in distribution of blacks as measured by the CDI indicates that the percentage of blacks in ranks E4 and E5 has increased while in all other ranks it has decreased. There are fewer blacks in senior ranks in 1982 than there were in 1976. This finding is undoubtedly due to the large number of blacks which have moved into the lower ranks at all three occupation levels, thereby reducing the proportion to be found in senior ranks.

Hispanic representation by rank is somewhat similar to that of blacks. As shown in Figure 5, Hispanics are underrepresented in high qualified occupations. However, the over and under representation is somewhat less than that of blacks. Hispanics, like blacks, also tend to be progressively underrepresented in higher ranks. The trend between 1976 and 1982 for Hispanics has also been similar to that of blacks. With the exception of rank E9, the trend of representation of Hispanics in highly qualified occupations has been toward equality. While there have been changes in trends in Hispanic representation in medium and low qualified occupations, no pattern is apparent.

Figure 6 presents the findings for Hispanic changes in representation and distribution between 1976 and 1982.

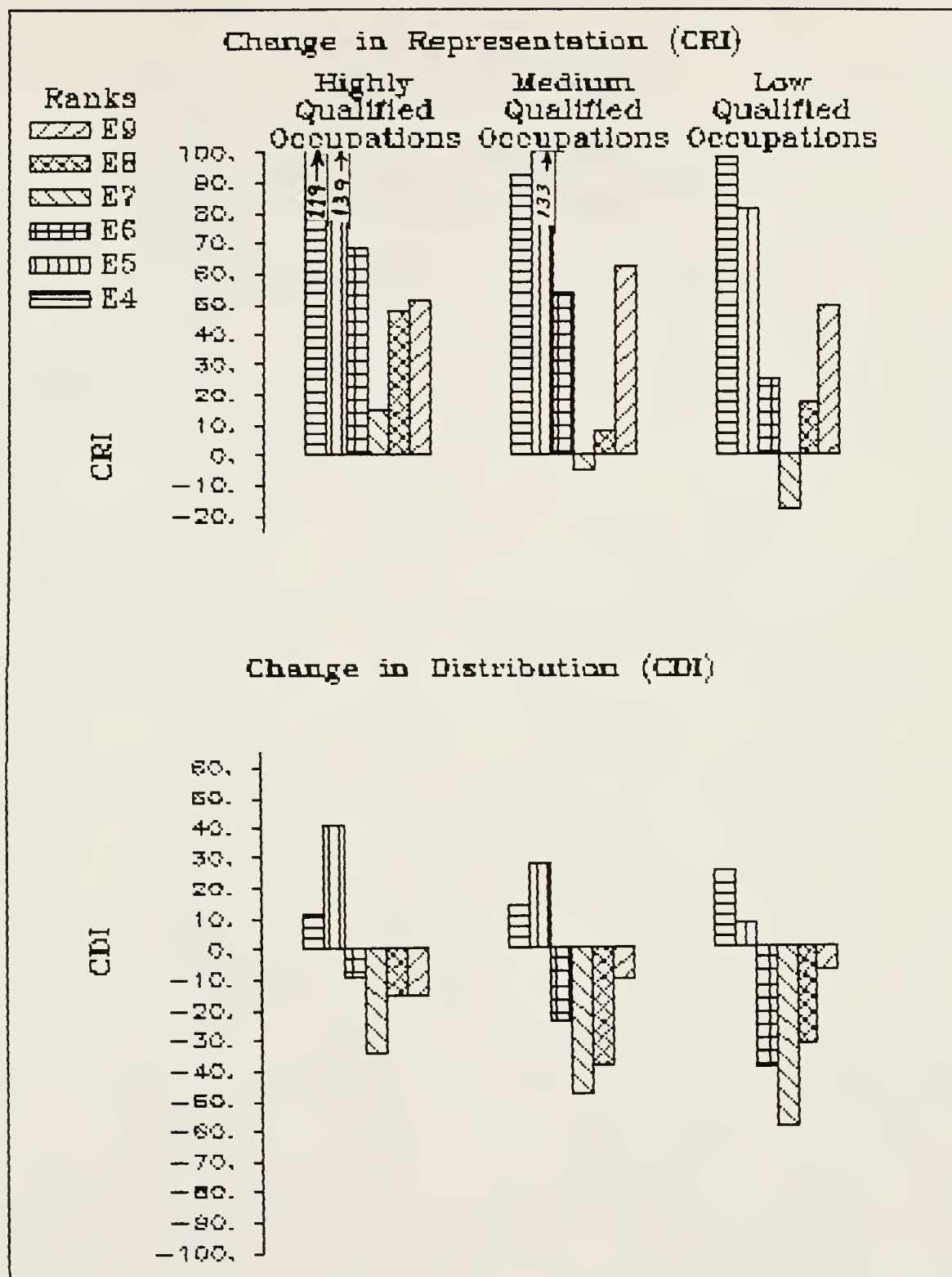


Figure 4

Changes in Black Representation and  
Distribution Between 1976 and 1982



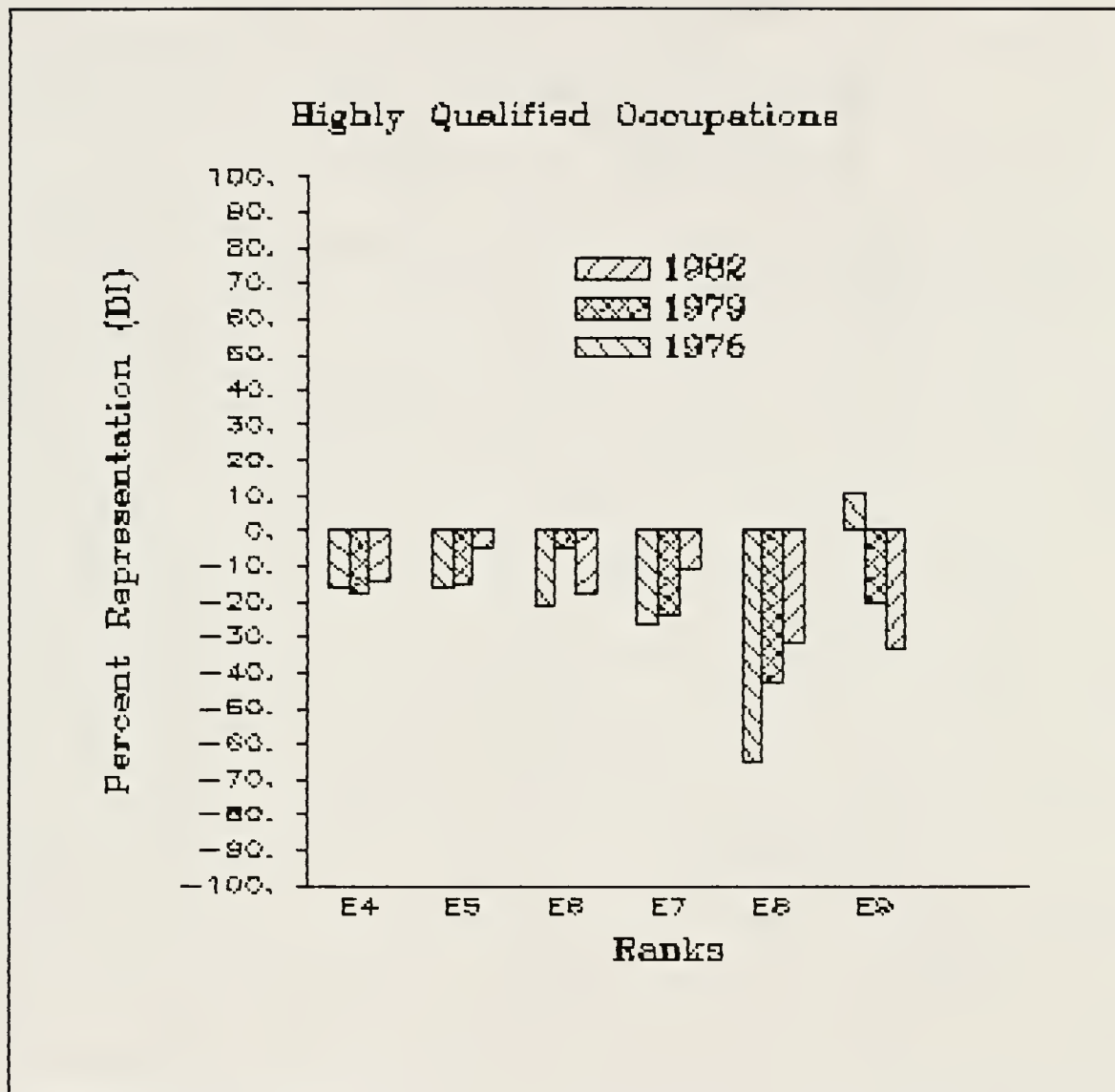


Figure 5

Hispanic Representation by Qualification

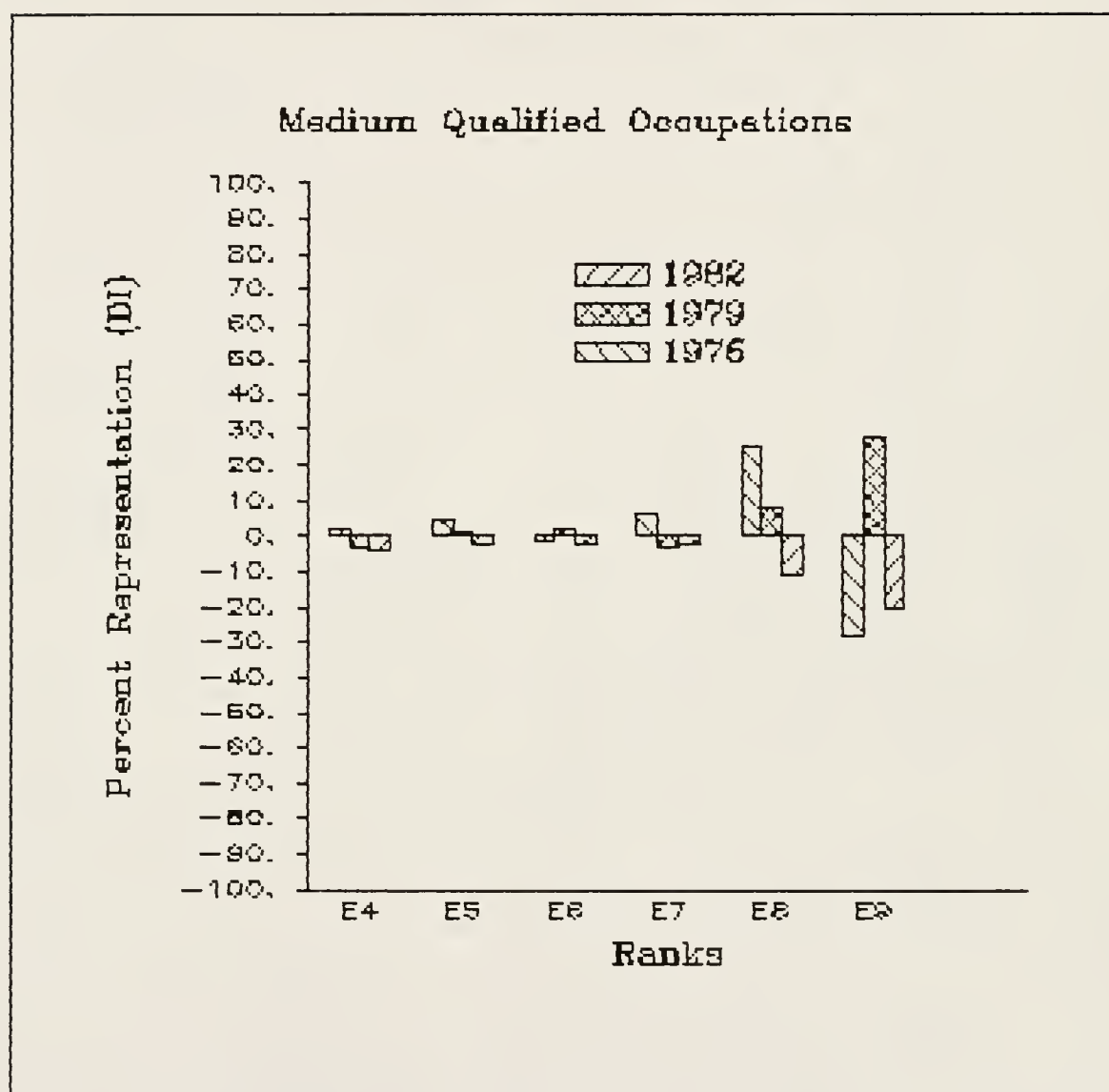


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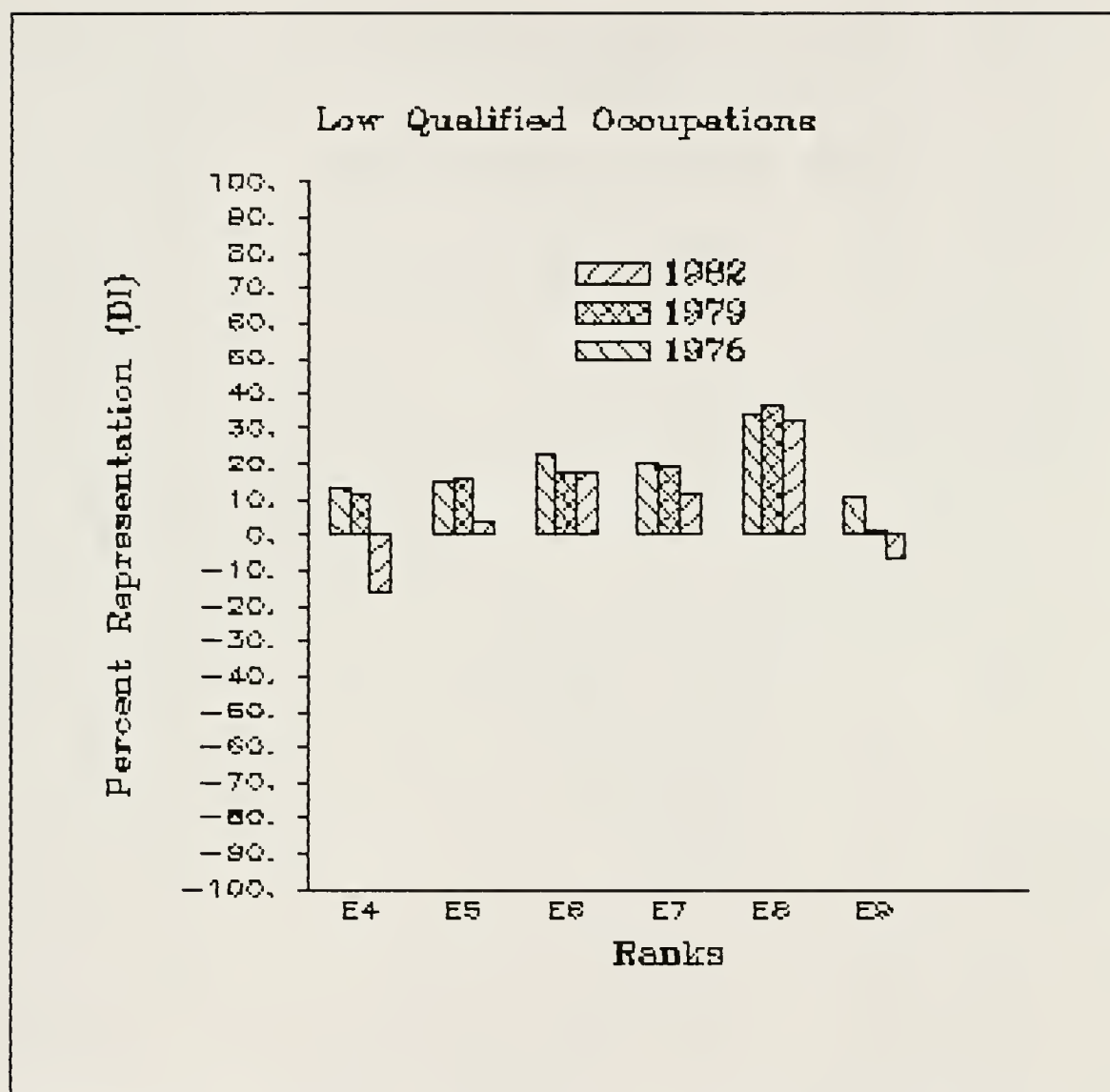


Figure 5--continued.

Hispanic representation, like that of blacks, increased in all ranks and levels of occupation qualifications, with the exception of rank E9. The greatest increase in representation of Hispanics was in the middle ranks of highly qualified occupations.

Changes in the distribution of Hispanics are mixed. There is a lower percentage of Hispanics in rank E4 in 1982 than there was in 1976. This may reflect either a smaller cohort being promoted in the petty officer ranks or the advancement of the cohort into the higher ranks. The increased percentage of Hispanics in ranks E5 suggest the latter explanation is the more likely.

The analysis of the data presented in the past few pages can be summarized as follows:

1. The Navy has substantially increased its black representation but produced no change in Hispanic representation.
2. Progress has been made toward equity in both specialty qualification and rank distribution of blacks, though the trend has as yet had little impact at the top ranks.
3. For Hispanics, the pattern is more modest and more mixed, but generally toward greater equality.

Further details, causes, and implications of these patterns will be explored by reference to the three models.

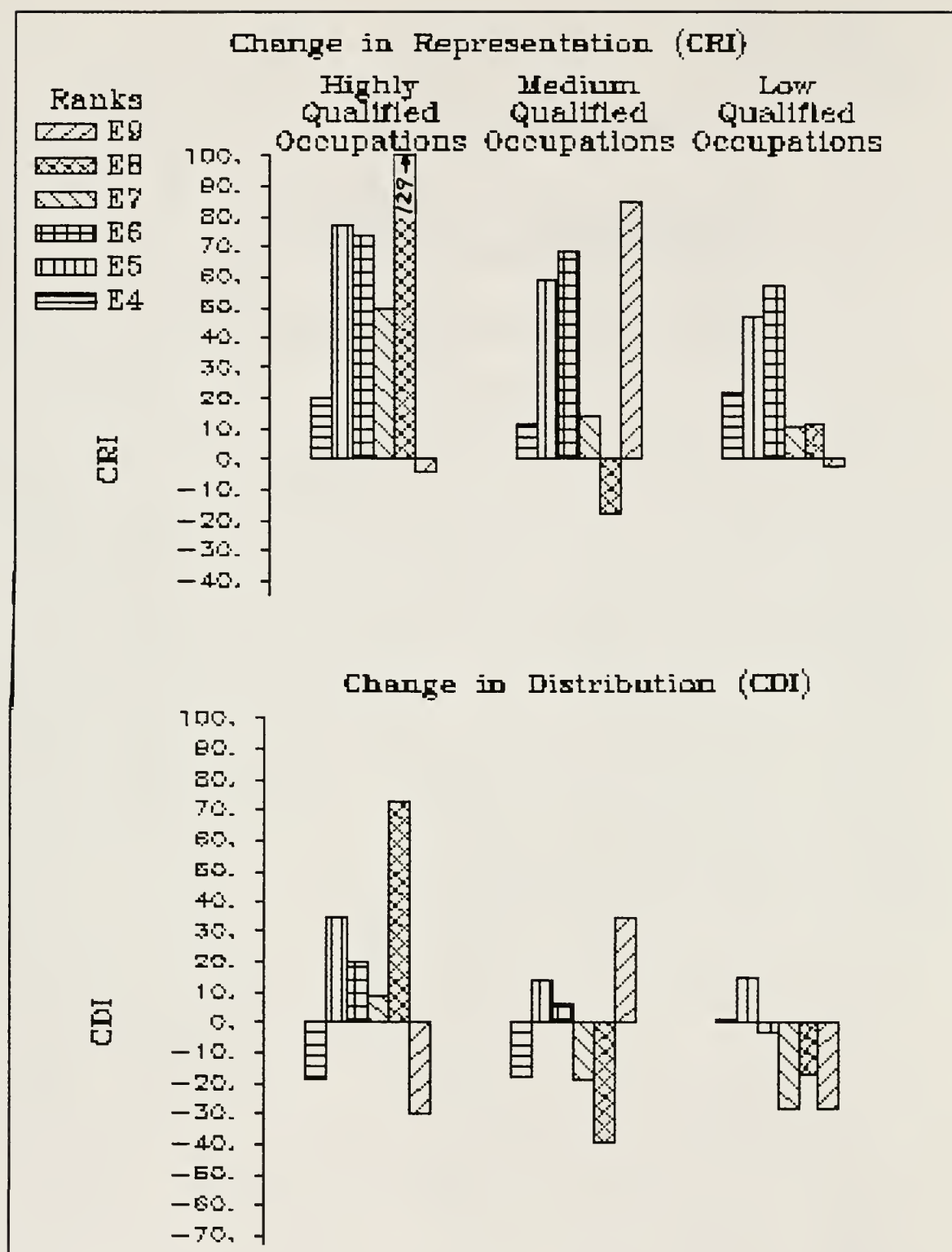


Figure 6

Changes in Hispanic Representation and  
Distribution Between 1976 and 1982

### Cohort Model

The Cohort model hypothesizes that those occupations where minorities are overrepresented in lower ranks (E4-E6) in 1976 will have a greater representation of minorities in senior ranks (E7-E9) in 1979 and 1982 than will occupations where minorities are underrepresented in lower ranks.

Blacks in ranks E4-E6 in 1976 were overrepresented in 30 occupations (N=10,842). Of these, six occupations were highly qualified (N=1,899), 11 were medium qualified (N=3,758) and 13 were low qualified (N=5,185). Blacks in lower ranks were underrepresented in 58 occupations (N=4,778). Of these, 31 were highly qualified (N=1,750), 18 were medium qualified (N=1,249), and nine were low qualified (N=1,779). Base line data for the black Cohort model are contained in Appendix B.

Figure 7 illustrates the DI's for ranks E7-E9 for occupations where blacks were over and under represented in lower ranks in 1976. The year 1976 in figure 7 has no interpretive meaning in relationship to the model, but is included to provide a comparison with other years.

In the case of blacks, the Cohort hypothesis is supported in all levels of qualification. Black representation in highly qualified occupations has the greatest inequality between occupation categories. Medium and low qualified occupations have similar and somewhat less inequalities in black representation.

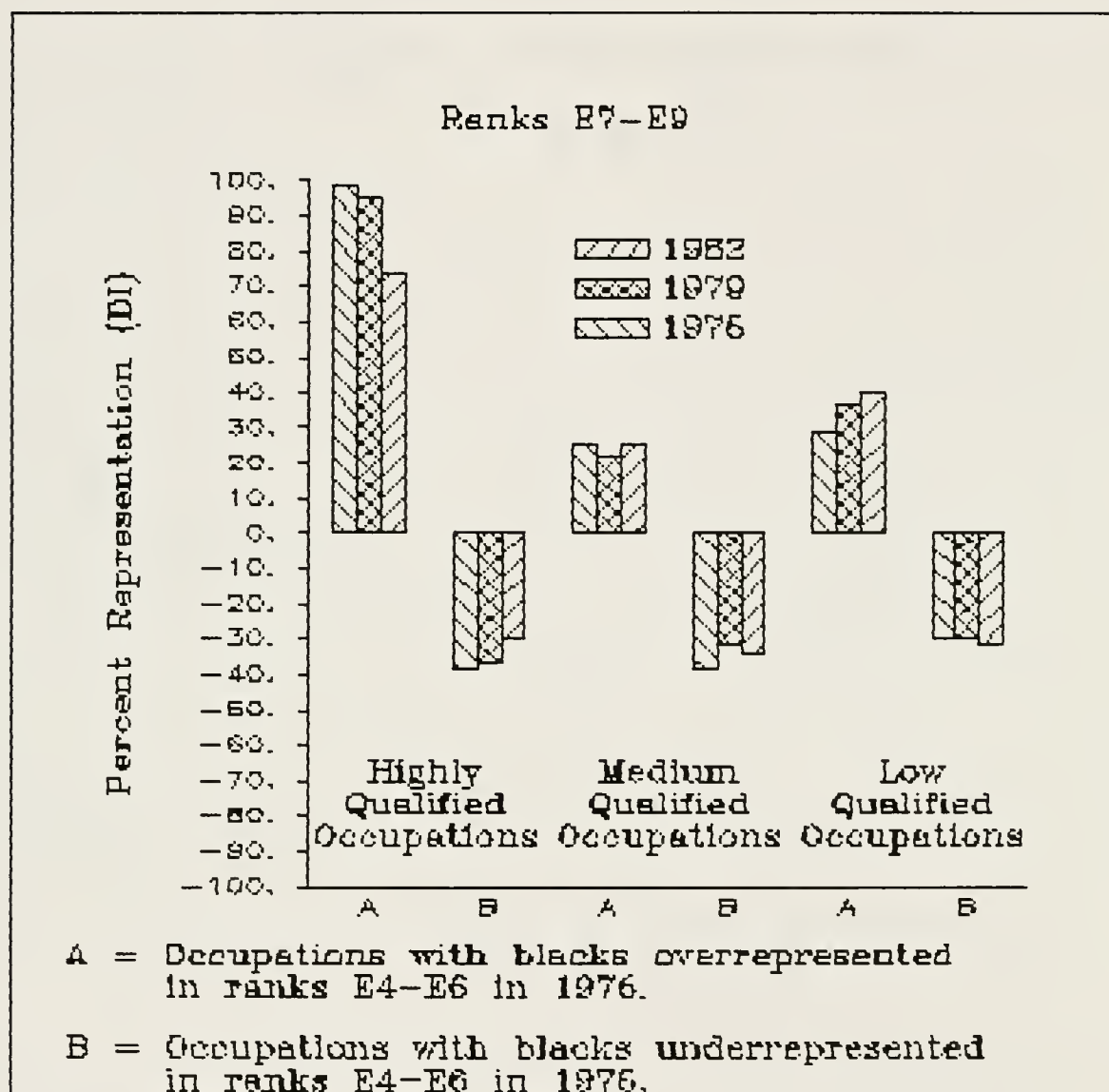


Figure 7

Black Cohort Model

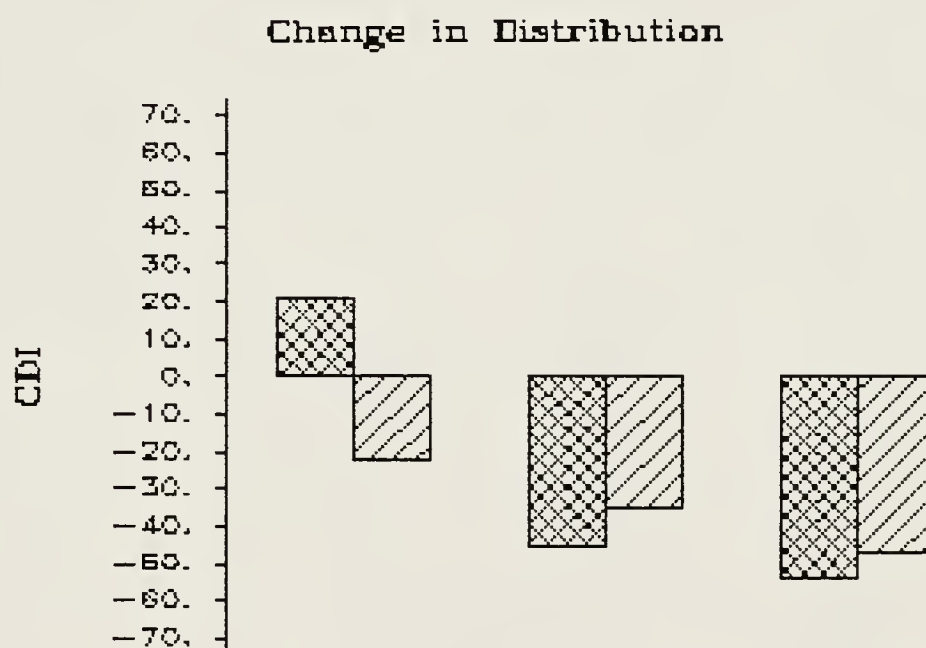
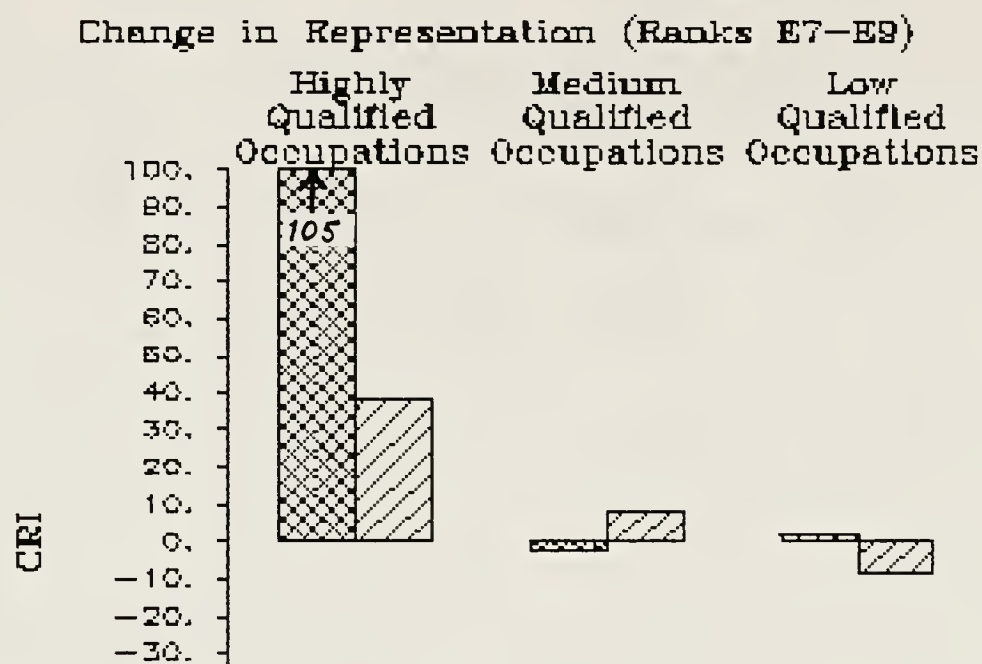


Black representation in low qualified occupations moved toward greater inequality from 1976 to 1982, while representation in occupations in the highly qualified category moved toward equality. Representation in medium qualified occupations has remained rather constant.

Figure 8 illustrates the changes in representation and distribution for the Cohort model. Changes in the representation of blacks support the Cohort hypothesis for highly qualified occupations only. For medium and low qualified occupations, there is little difference in the CRI between the two categories of occupations, and the hypothesis is not supported.

Changes in the distribution of blacks also support the Cohort hypothesis in the case of highly qualified occupations. In the cases of medium and low qualified occupations, the differences in the two categories is opposite that predicted by the model.

The large increase in black representation in highly qualified occupations and rather small changes in medium and low qualified occupations is due to several factors which can be explained by examination of the actual numbers of blacks and whites in the two occupational categories. In highly qualified occupations there was a large increase in the number of blacks in both the occupation category where they represented a cohort. In medium and low qualified occupations, the number of blacks in high ranks decreased in



Representation in Ranks E4-E8 in 1976

▨ Occupations with blacks underrepresented

▩ Occupations with blacks overrepresented

Figure 8

Black Cohort Model  
Changes in Representation and  
Distribution Between 1976 and 1982

occupations where the black cohort was large, while, in occupations where the cohort was small, the results were mixed. The number of blacks increased in medium qualified occupations and decreased in low qualified occupations.

Figure 8 reveals a sharp difference in the CDI in highly qualified occupations between the occupation category where blacks represent a large cohort in lower ranks and the category where that cohort is small. In medium and low qualified occupations, the CDI is negative in both categories of occupations. The CDI is being influenced by large increases in the number of blacks in lower ranks of all occupation categories.

In summary, the cohort of blacks in low ranks does have an effect on the representation of blacks in high ranks when measured by the DI. This effect is most pronounced in highly qualified occupations. With the exception of highly qualified occupations, the cohort of blacks in low ranks seems to have little effect on changes in the representation or distribution of blacks in higher ranks between 1976 and 1982.

In 1976 Hispanics were overrepresented in ranks E4-E6 in 39 occupations (N=11,945). Of these, 11 were highly qualified occupations (N=2,234), 14 were medium qualified (N=3,768), and 14 were low qualified (N=5,943). Hispanics were underrepresented in 49 occupations (N=3,675). Twenty-six of which were highly qualified occupations (N=1,415), 15

were medium qualified (N=1,239), and eight were low qualified (N=1,021). The actual numbers of Hispanics in each rank and occupation category are in Appendix C.

As can be seen in Figure 9, the DI indicates that Hispanic representation in the Cohort model resembles that of blacks. Like blacks, the greatest inequality in Hispanic representation is in highly qualified occupations. Also, representation in medium and low qualified occupations is similar to that of blacks. The trend in Hispanic representation is toward greater inequality in all three categories of qualification.

Changes in representation and distribution of Hispanic cohorts as measured by the CRI and CDI are given in Figure 10. As was the case for blacks, the Cohort hypothesis is supported for Hispanics in highly qualified occupations. Change in representation in medium and low qualified occupations is in the direction predicted by the model, but is not as marked as in the highly qualified occupations.

The change in distribution of Hispanics is in the direction predicted by the Cohort model in the case of highly qualified occupations. In medium and low qualified occupations, the CDI is negative for both categories of occupations.

Again, as was the case with blacks, the size of the cohort of Hispanics in low ranks seems to have some effect on the distribution of Hispanics in high ranks, particularly

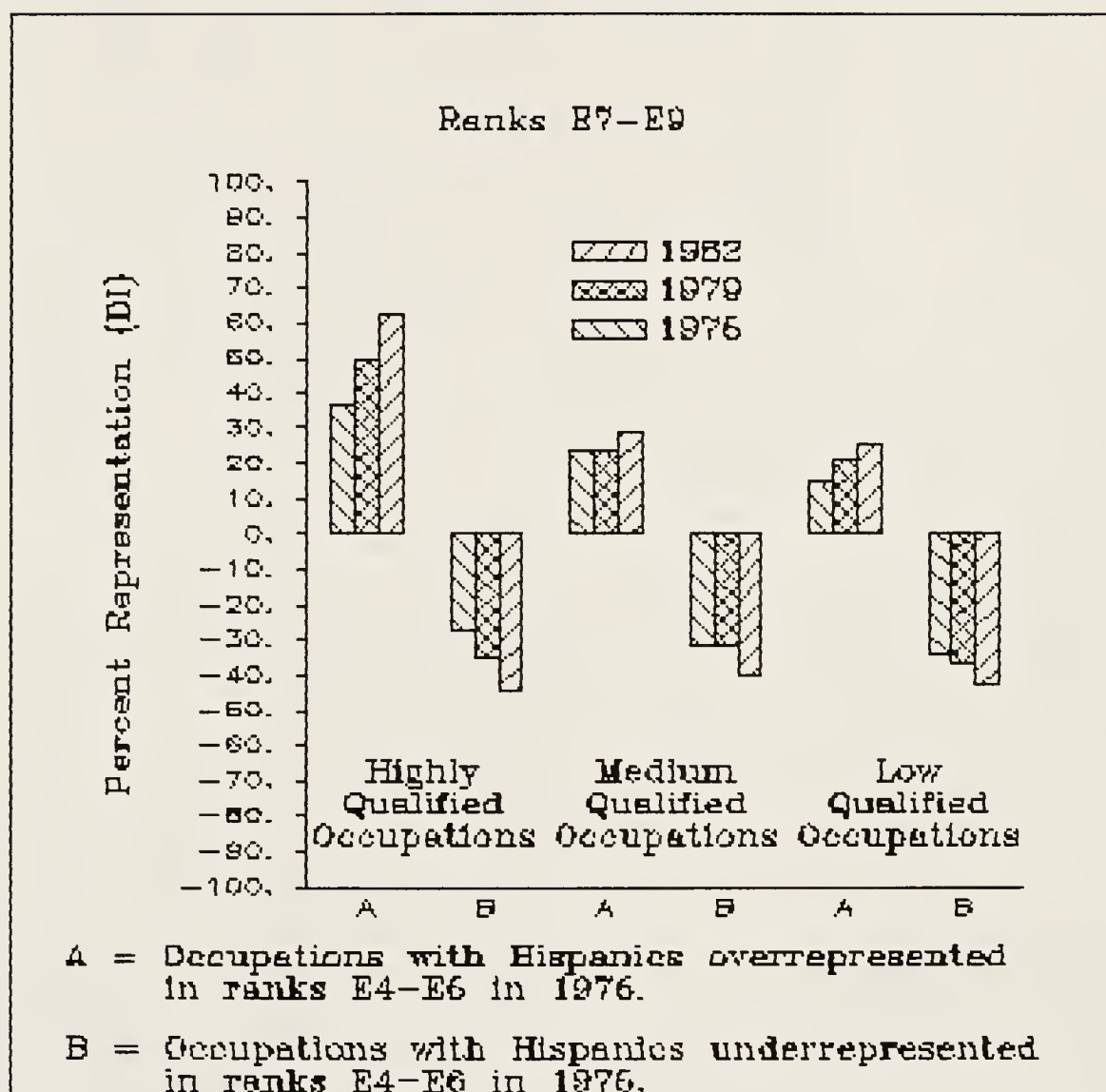


Figure 9

Hispanic Cohort Model

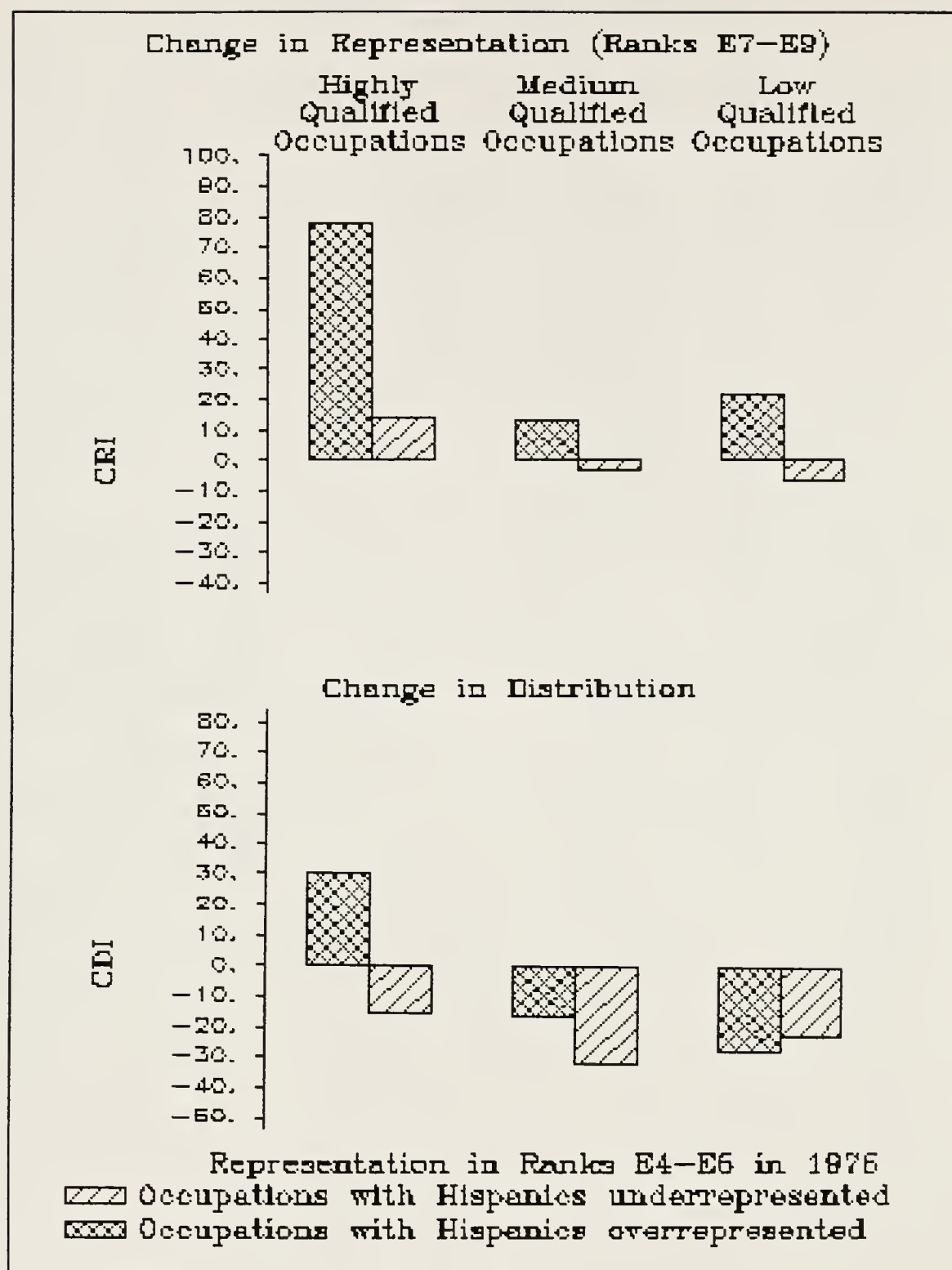


Figure 10

Hispanic Cohort Model  
 Changes in Representation and  
 Distribution Between 1976 and 1982

those in highly qualified occupations. Changes in representation between 1976 and 1982 also appear to support the Cohort model in the case of highly qualified occupations. For medium and low qualified occupations, the results are somewhat less supportive.

There are some differences between Hispanic and black representation in the Cohort model which should be mentioned. Blacks tend to be more overrepresented in those highly qualified occupations where they were a large cohort in ranks E4-E6 in 1976 than was the case with Hispanics. Also, the trends in the DI's for blacks and Hispanics for this category are reversed. Blacks tend to be moving toward greater equality while Hispanics are moving toward greater inequality. This effect is undoubtedly due to the increase in the expected percentage for blacks between 1976 and 1982 which has the effect of reducing their overrepresentation.

Finally, the Cohort model is generally supported for both blacks and Hispanics in highly qualified occupations, but there is little support for the model in medium and low qualified occupations.

#### Self-interest Model

The Self-interest model analyzes the effect of members of a minority group in discretionary positions in 1976 on the distribution of members of that minority group in 1979 and 1982.



Blacks were overrepresented in discretionary positions in 23 occupations in 1976. Three occupations were in the highly qualified category (N=704), seven were medium qualified (N=2,216), and 13 were low qualified (N=5,205). Blacks were underrepresented in 65 occupations, 34 of which were highly qualified (N=2,945), 22 medium qualified (N=2,791, and nine low qualified (N=1,759).

Hispanics were overrepresented in discretionary positions in 11 occupations. Of these, one was highly qualified (N=21), six were medium qualified (N=396), and four were low qualified (N=396). Hispanics were underrepresented in discretionary positions in 77 occupations; 36 highly qualified (N=3,617), 23 medium qualified (N=3,645) and 18 low qualified (N=5,229).

The few number of occupations in which Hispanics were overrepresented in discretionary positions presents some problems in interpretation which will be discussed later in this section.

The Self-interest model is based on representation of black and Hispanic groups in occupations where they were overrepresented in discretionary positions in 1976. Since these occupations were treated as underrepresented in 1982 regardless of the actual representation in that year, it would be useful to examine the 1982 occupations in order to determine the changes in representation of blacks and Hispanics in discretionary positions between 1976 and 1982.

If there were more occupations in which minorities were overrepresented in discretionary positions, it would be evidence that they were gaining discretionary power in the Navy. Conversely, if the number of occupations in which black or Hispanic minorities were overrepresented in discretionary positions was less, one could assume that they were losing discretionary power.

In 1982, blacks were overrepresented in 6 occupations in which they were underrepresented in 1976. They were underrepresented in 3 occupations in which they were overrepresented in 1976. Blacks, therefore, had a net gain in discretionary power of 3 occupations.

The changes in occupations where Hispanics held discretionary positions are much different from those of blacks. In 1982, Hispanics gained discretionary power in 20 occupations in which they were underrepresented in 1976 while losing discretionary power in 0 occupations.

It appears that, although both blacks and Hispanics have gained discretionary power, the gains made by Hispanics have been much greater than those made by blacks.

Figure 11 summarizes the findings for the black Self-interest model. These figures illustrate the data for ranks E4-E6 and E7-E9. Data on each individual rank is contained in Appendix D.

The data for 1976 lacks interpretive meaning. It is reported only in order to provide a comparison for the years 1976 and 1982.

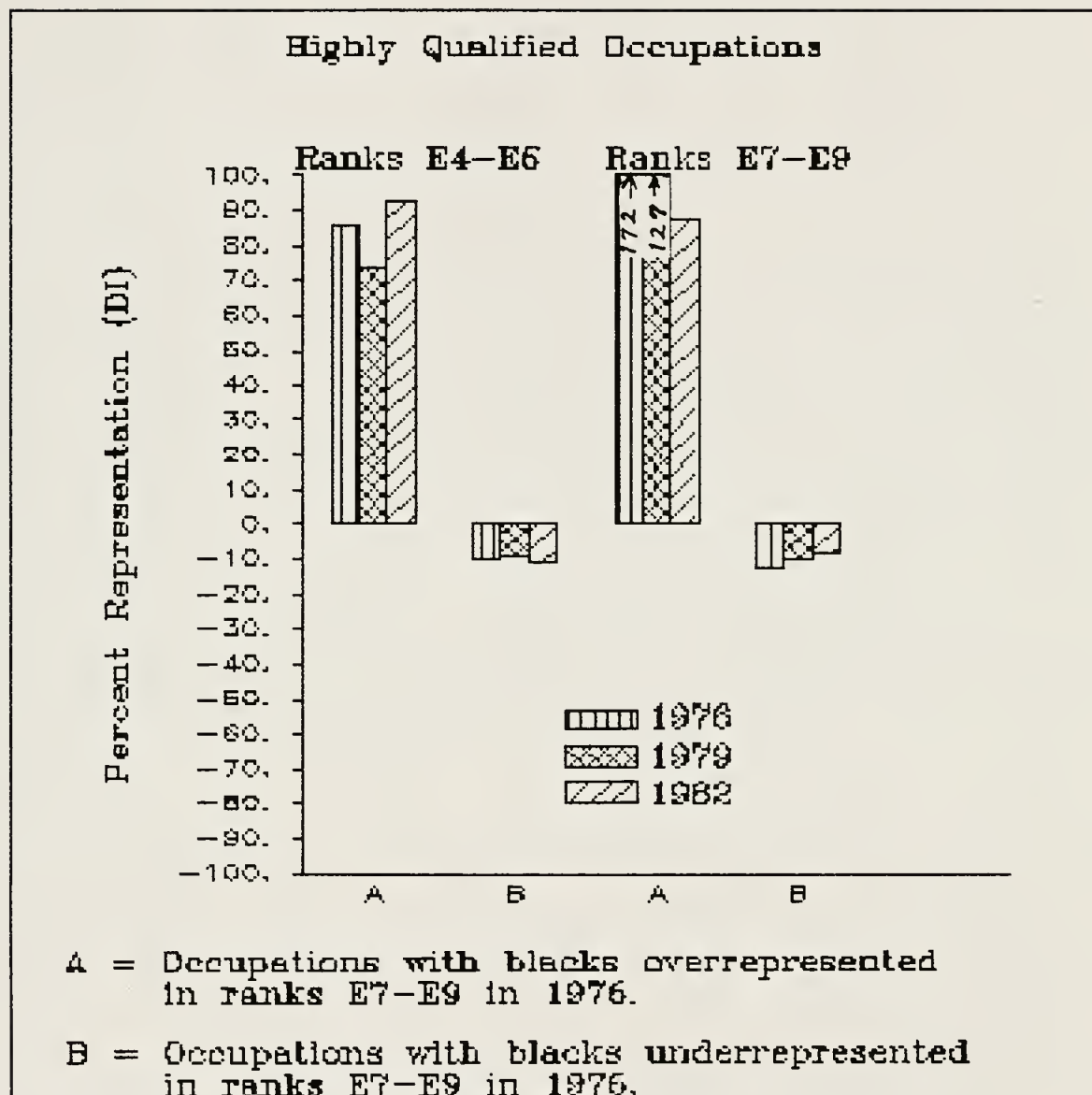


Figure 11

Black Self-interest Model

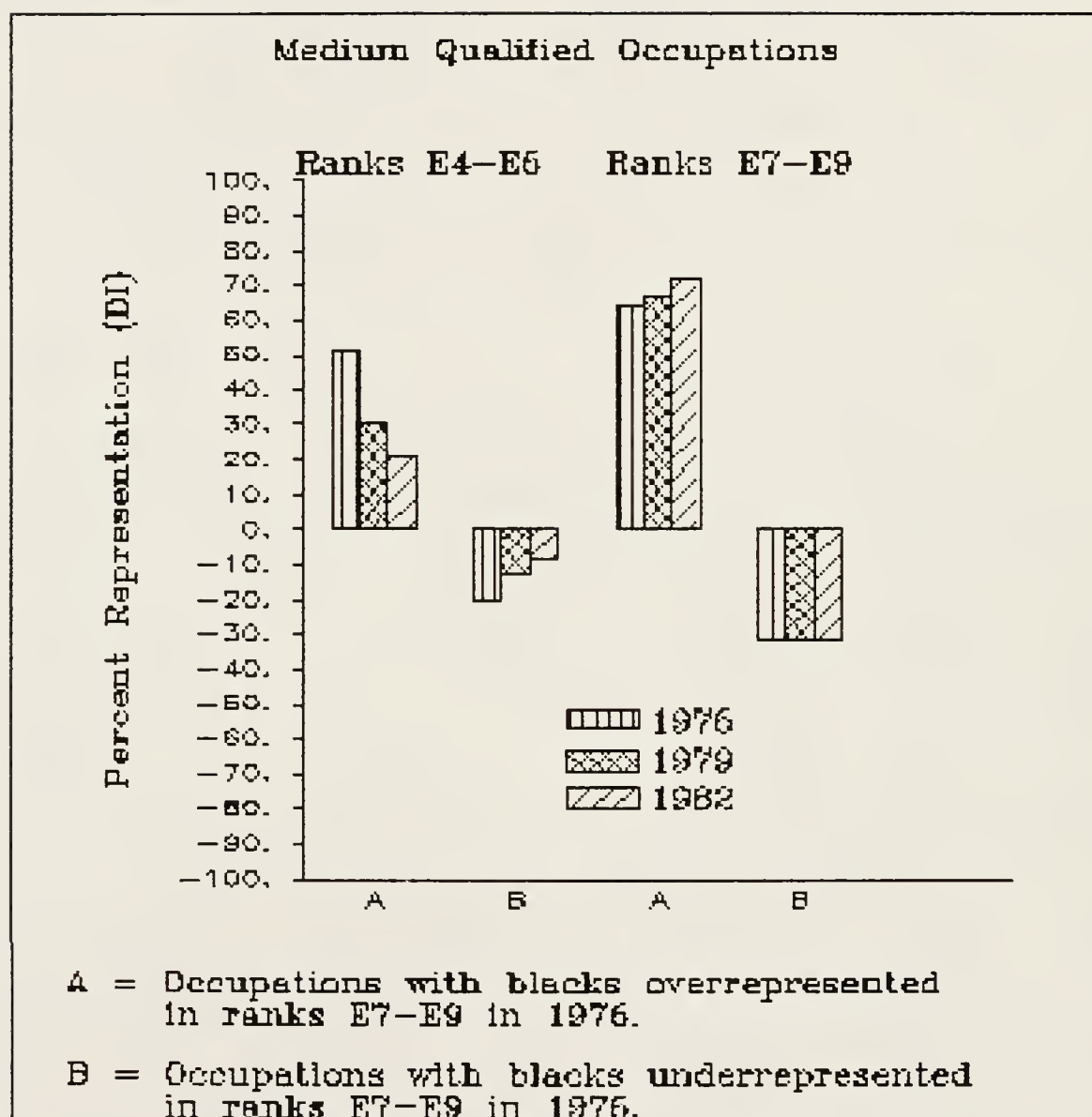


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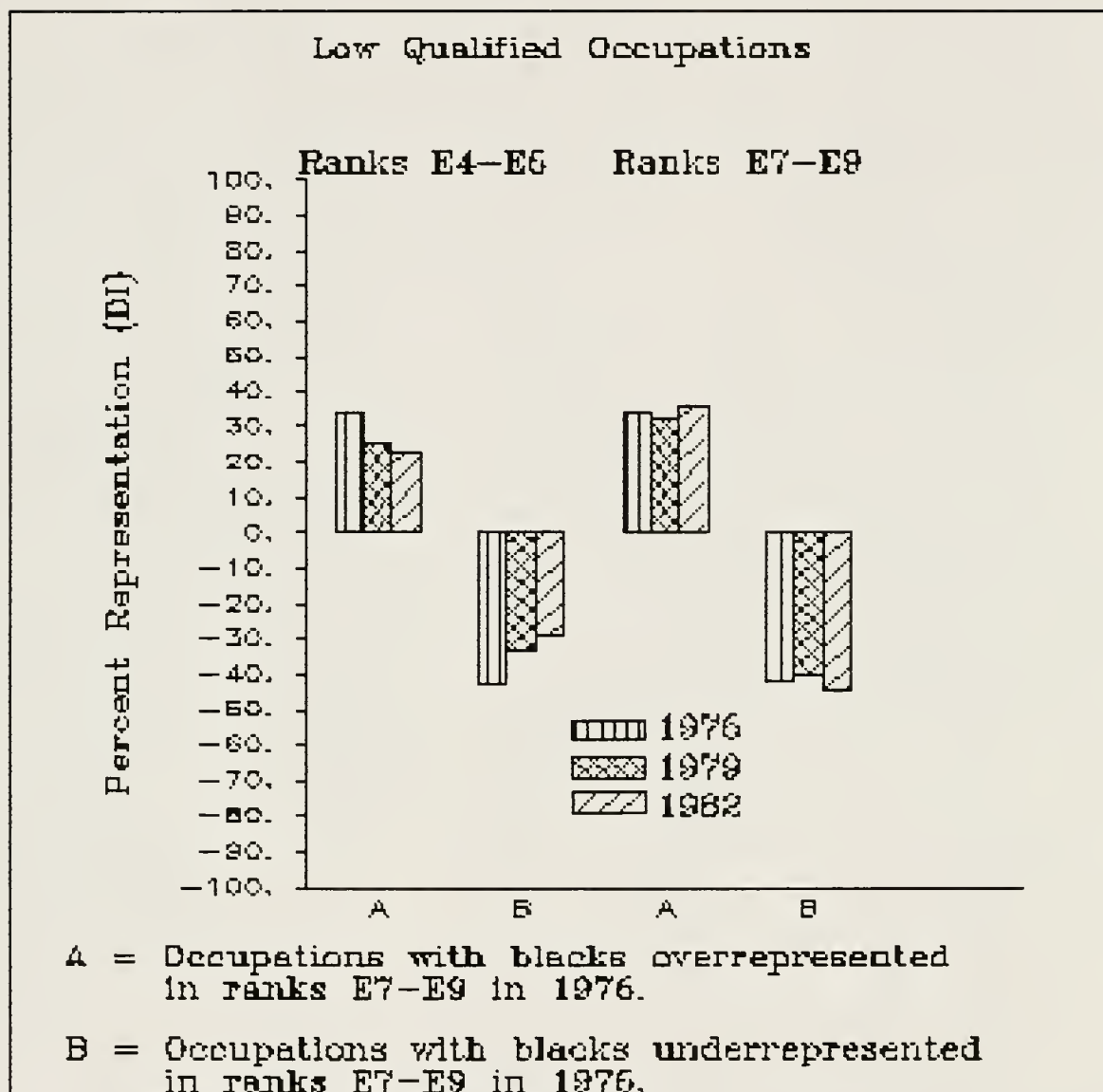


Figure 11--continued.

The black Self-interest hypothesis is supported for all levels of qualification. The overrepresentation of blacks in ranks E7-E9 in occupation categories where they have discretionary power seems to vary directly with the qualification of the occupation. That is, blacks in highly qualified occupations seem to have more effect on acting in the interest of other blacks than do blacks in medium and low qualified occupations.

It is apparent that, in the occupations where blacks are overrepresented in discretionary positions in 1976, they are greatly overrepresented in 1979 and 1982, whereas, in those occupations where they were underrepresented in discretionary positions in 1976, they are only slightly underrepresented in 1979 and 1982. Reasons for these differences are not known.

The DI's for ranks E7-E9 are, in all cases, larger than the DI's for ranks E4-E6. A possible interpretation for this fact is that blacks in higher ranks are better able to act in the interest of other blacks by getting them promoted into higher ranks once they are in an occupation than they are by getting them into the occupation in lower ranks.

It appears that, with the exception of ranks E4-E6 in highly qualified occupations, and ranks E7-E9 in medium qualified occupations, the representation of blacks is moving toward equality. This trend is to be expected, and probably reflects the increase in the expected percentage between 1976 and 1982.

Changes in the representation of blacks increased in both categories of occupations for both high and low ranks. The increase in the occupation category where blacks were overrepresented in discretionary positions is greater than in the category where they had less discretionary power. This finding provides some support for the Self-interest model in that it is in the direction predicted by the model. In medium and low qualified occupations the differences in the CRI's are opposite those predicted by the model. With the possible exception of highly qualified occupations, the percent of blacks in discretionary positions seems to have little effect on changes in black representation in higher ranks, and even less effect on their representation in lower ranks.

Changes in the distribution of blacks as shown in Figure 12 also provide little support for the Self-interest model. The CDI is no doubt being influenced by a large increase of blacks in lower ranks of all three levels of qualification and both categories of occupations. Figure 13 presents the DI's for the Hispanic Self-interest model. Data on individual ranks for this model are contained in Appendix E. As mentioned earlier in this chapter, there are some problems with interpretation of these data. In the highly qualified occupations, due to the small number (N=21) of Hispanics in discretionary positions, and the fact that Hispanics were overrepresented in only 1



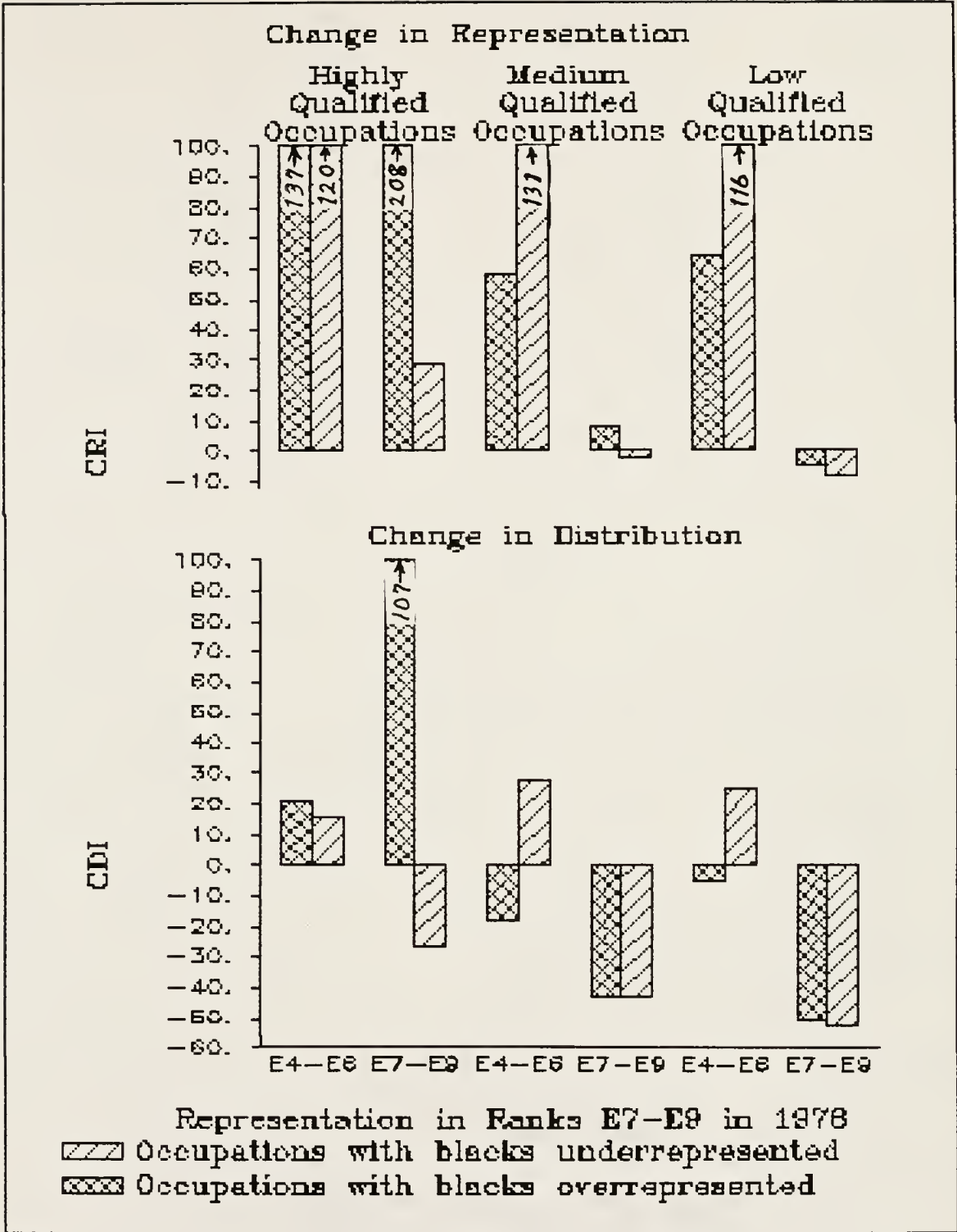


Figure 12

Black Self-interest Model  
Changes in Representation and  
Distribution Between 1976 and 1982

occupation, the data probably cannot be meaningfully interpreted.

In the medium and low qualified occupations, the Self-interest hypothesis is supported. The findings for Hispanics are similar to those of blacks. Where Hispanics are overrepresented, they are highly overrepresented, but where they are underrepresented, they are only slightly so. Additionally, ranks E7-E9 tend to be more overrepresented than ranks E4-E6. It is possible that Hispanics in discretionary positions, like blacks, have more influence on increasing Hispanic representation in discretionary positions than they do on increasing representation in lower ranks.

The trend for Hispanics seems to also follow the same pattern as blacks. With the exception of a tendency toward no change in representation in ranks E7-E9 in highly qualified and medium qualified occupations, there is a definite trend toward equality.

Changes in the representation of Hispanics in occupations between 1976 and 1982 show little resemblance to those predicted by the Self-interest model. As can be seen from Figure 14, the CRI in highly qualified occupations is opposite that predicted by the model. In medium and low qualified occupations, the findings are varied, and either show little difference between the occupation categories, or are opposite those predicted by the model.

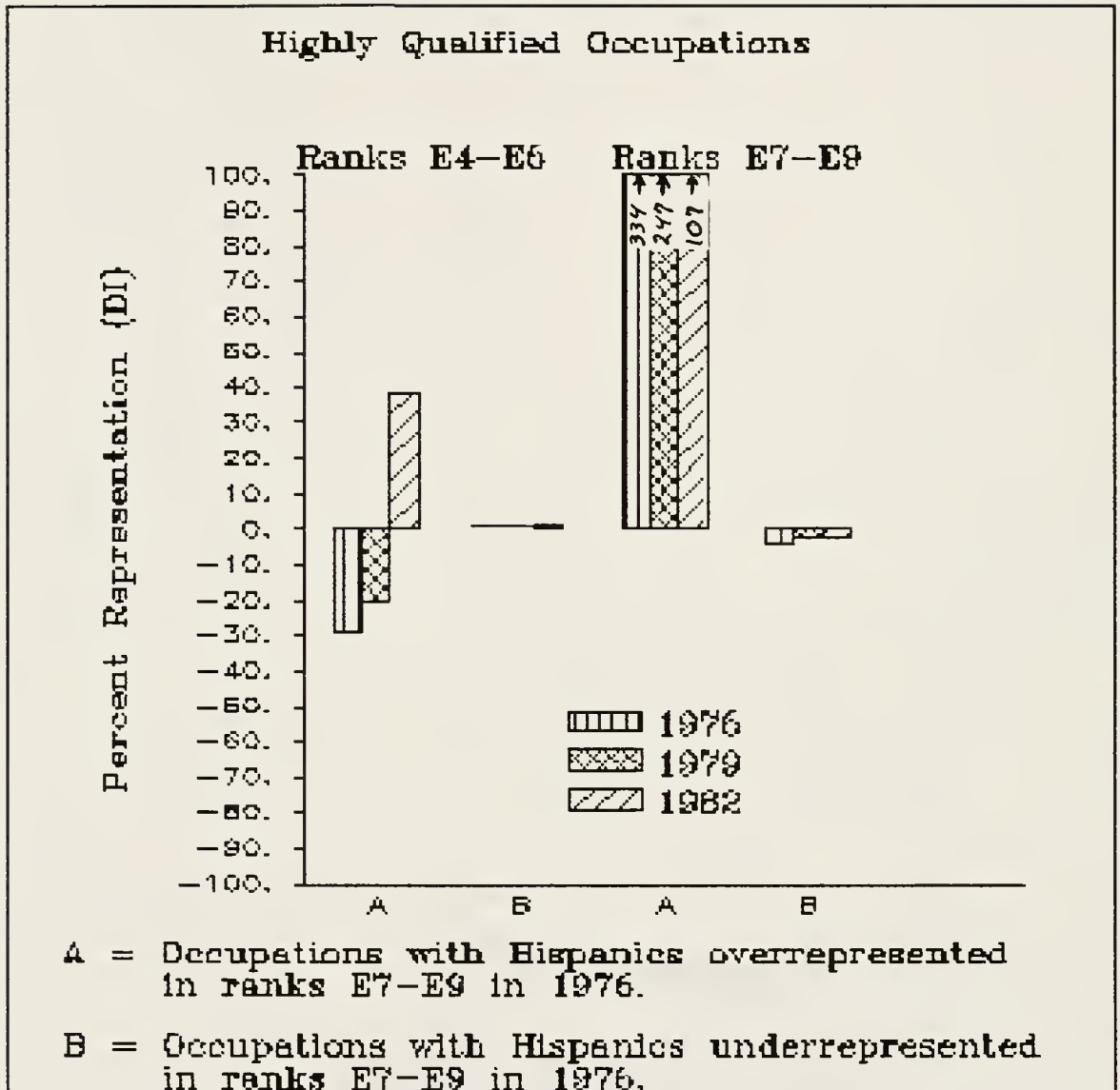


Figure 13

Hispanic Self-interest Model

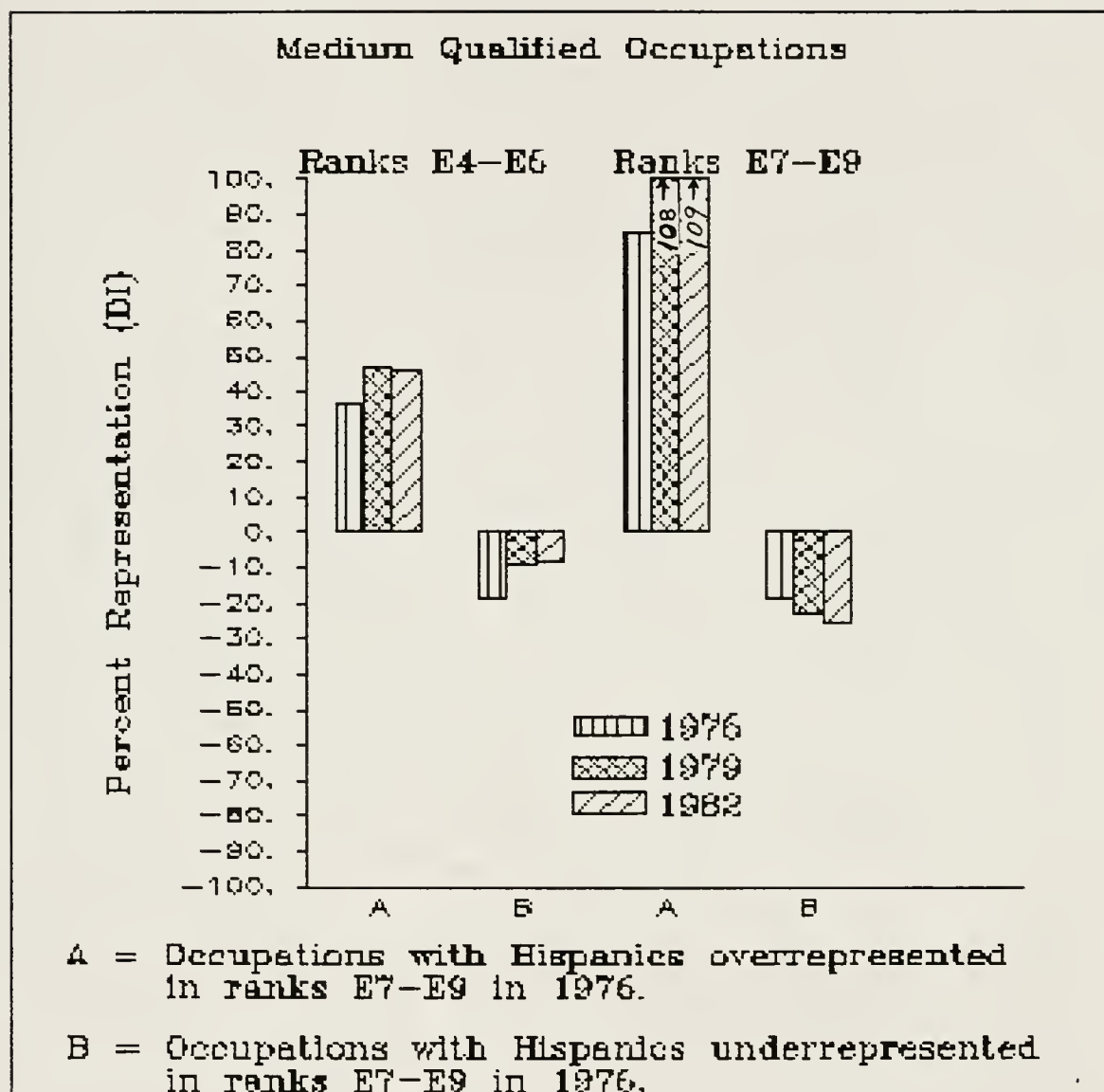


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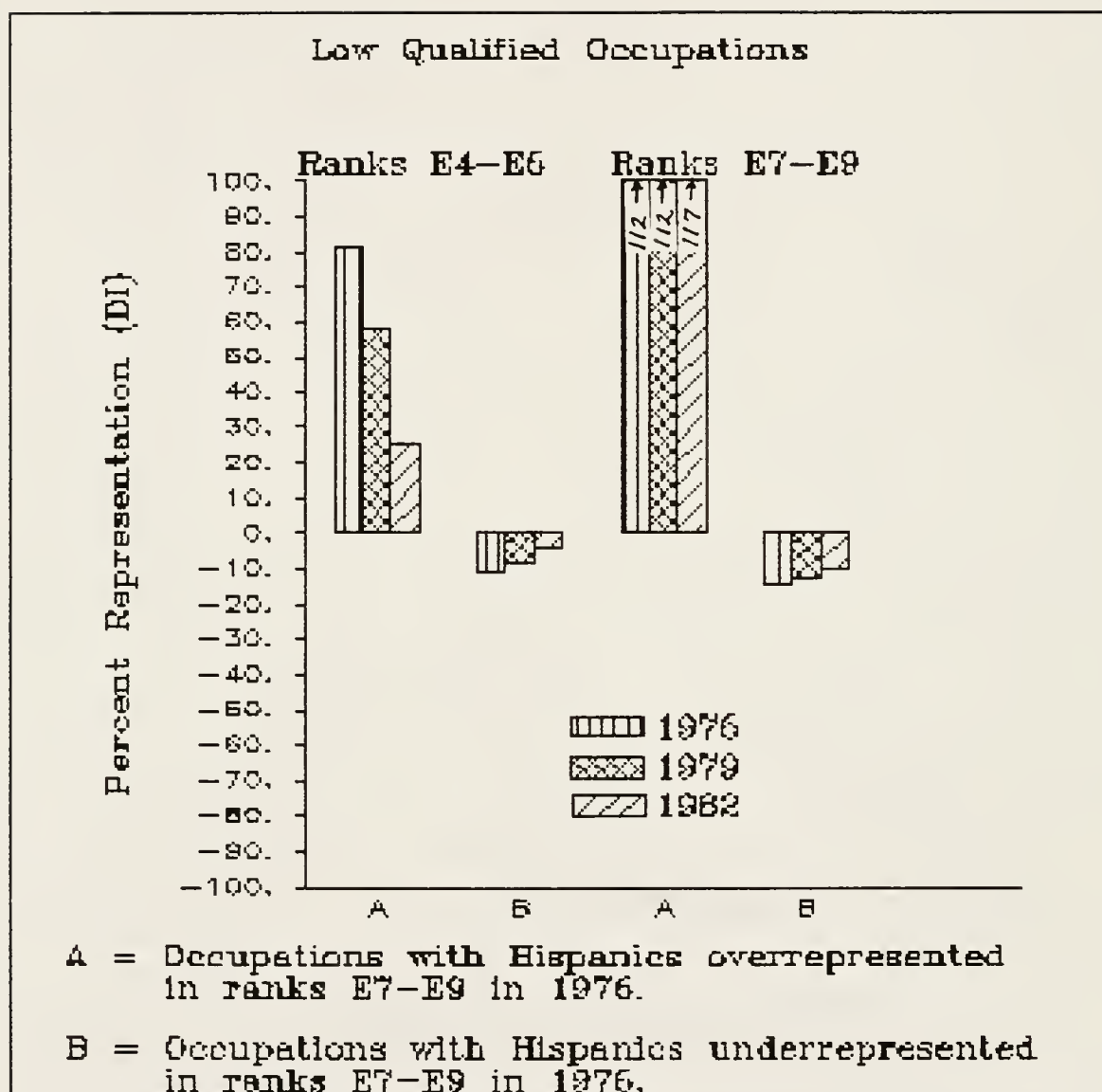


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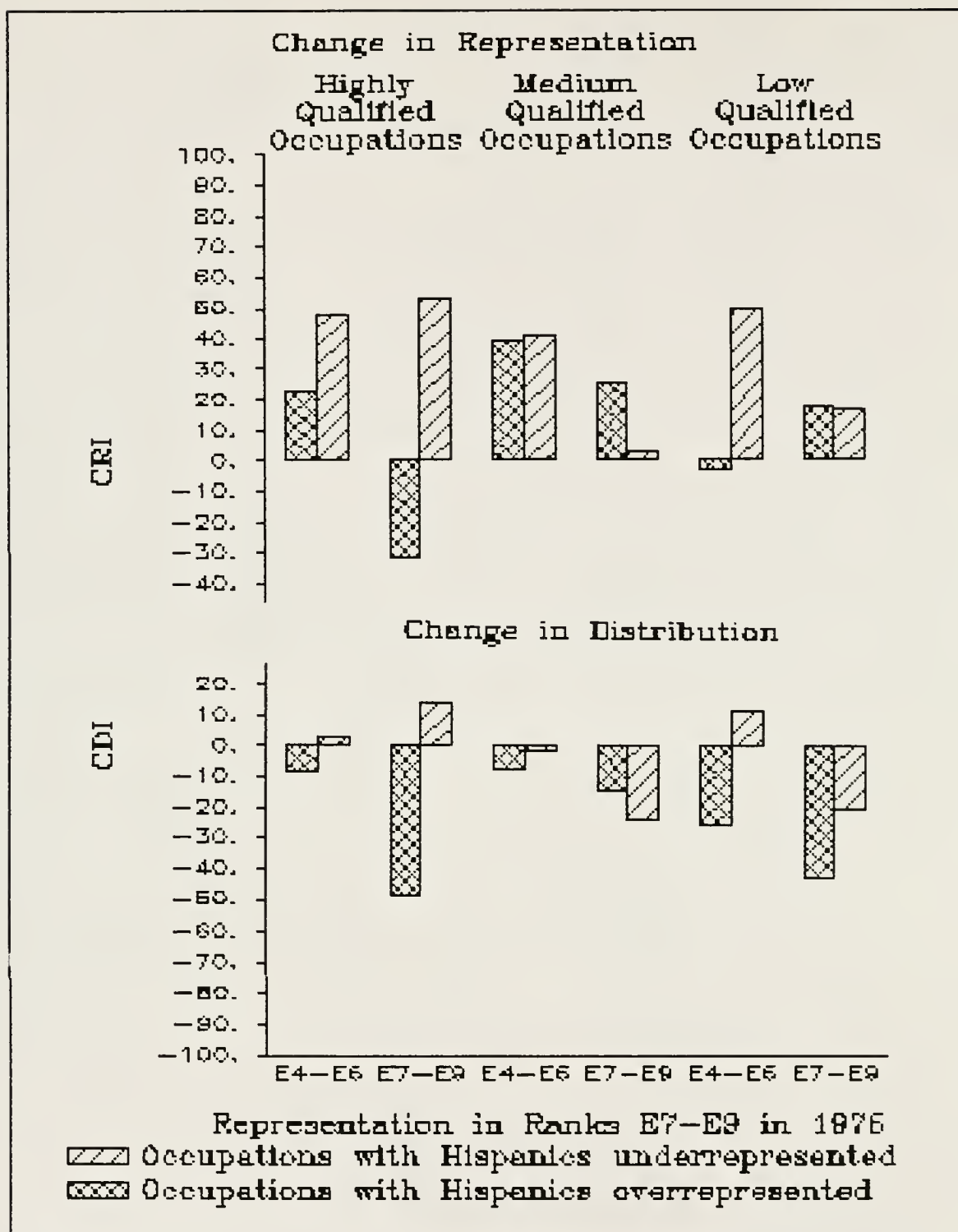


Figure 14

Hispanic Self-interest Model  
 Changes in Representation and  
 Distribution Between 1976 and 1982

The changes in the CDI's in the case of Hispanics are inconclusive with regard to support for the model. This is undoubtedly due to the fact that changes in the actual number of Hispanics between 1976 and 1982 were slight for all categories of occupations. This fact, in conjunction with the exaggeration of the CDI produced by the small change in the actual numbers of Hispanics, makes it impossible to draw any meaningful conclusions with regard to changes in the distribution of Hispanics.

Finally, tests of the Self-interest model have not produced highly supportive results. In the case of Hispanics, it is due primarily to the small number of Hispanics in discretionary positions and the few changes in the actual number of Hispanics between 1976 and 1982. In the case of blacks, the Self-interest model was strongly supported in highly qualified occupations, but there was virtually no such support in either of the other two occupation categories.

#### Core Technology Model

The Core Technology model analyzed the distribution of blacks and Hispanics in occupations that represent the core, core support, and support technologies of the Navy. It was hypothesized that blacks and Hispanics would be underrepresented in core technology occupations and overrepresented in core support and support technology occupations.



The occupation specialties and personnel in core, core support, and support technologies are indicated in Table 3. With the exception of low qualified occupations in the core support category which contains only two occupations, the occupations as well as the number of white, black, and Hispanic personnel in each category of technology offer a sufficient number of cases for confident generalization. Appendices F and G contain a breakdown of each technology and rank category.

As can be seen from Table 3, core technology represents the largest category both in terms of number of occupations and total number of personnel. The core support technology group of occupations comprises the second largest category of personnel but has slightly fewer occupations than does the support category. The Highly qualified category of occupations has both the largest number of occupations (37) and the largest number of total personnel (86,984). The medium qualified category has the second largest number of occupations (32) but the lowest number of total personnel (7,948). The low qualified category contains the fewest number of occupations (19) but contains almost as many total personnel as the highly qualified category (86,003).

Figure 15 depicts the representation of blacks in core, core support, and support technology occupations. In the case of blacks, the Core Technology hypothesis is partially

Table 3  
Core, Core Support, and Support Occupations

	Core Occupations				Core Support Occupations				Support Occupations			
	Occs.	White	Black	Hisp.	Occs.	White	Black	Hisp.	Occs.	White	Black	Hisp.
High Qual.	15	25,189	1,220	516	13	38,544	3,585	1,132	9	13,573	2,598	627
Med. Qual.	14	25,570	4,045	820	7	26,131	2,614	784	11	10,900	2,511	573
Low Qual.	10	45,850	6,167	1,543	2	6,890	1,186	391	7	18,576	4,414	1,036
Total	39	74,009	11,432	2,879	22	71,565	7,385	2,257	27	43,049	9,523	2,236

supported. Blacks, with the exception of those in ranks E4-E6 in medium qualified occupations, are underrepresented in core technology occupations and overrepresented in support technology occupations in all categories of qualifications. The hypothesis predicted blacks would be overrepresented in core support technology occupations. However, findings in this category are mixed. Blacks are rather equitably represented in highly qualified occupations and underrepresented in medium qualified occupations. In low qualified occupations, blacks are largely underrepresented in ranks E7-E9 and fairly equitably represented in ranks E4-E6, with a rather sharp upward trend from underrepresentation in 1976 to overrepresentation in 1982.

The distribution of blacks in support technology occupations revealed rather surprising findings. Blacks are largely overrepresented in each level of qualification. With the exception of the highly qualified level where blacks in ranks E4-E6 are slightly more overrepresented than in ranks E7-E9, the overrepresentation in both rank categories is similar. The overrepresentation of blacks in both rank categories increases with the level of qualification. That is, blacks are the most overrepresented in highly qualified support occupations and the least overrepresented in low qualified occupations. Given the effects of historical discrimination in the Navy which

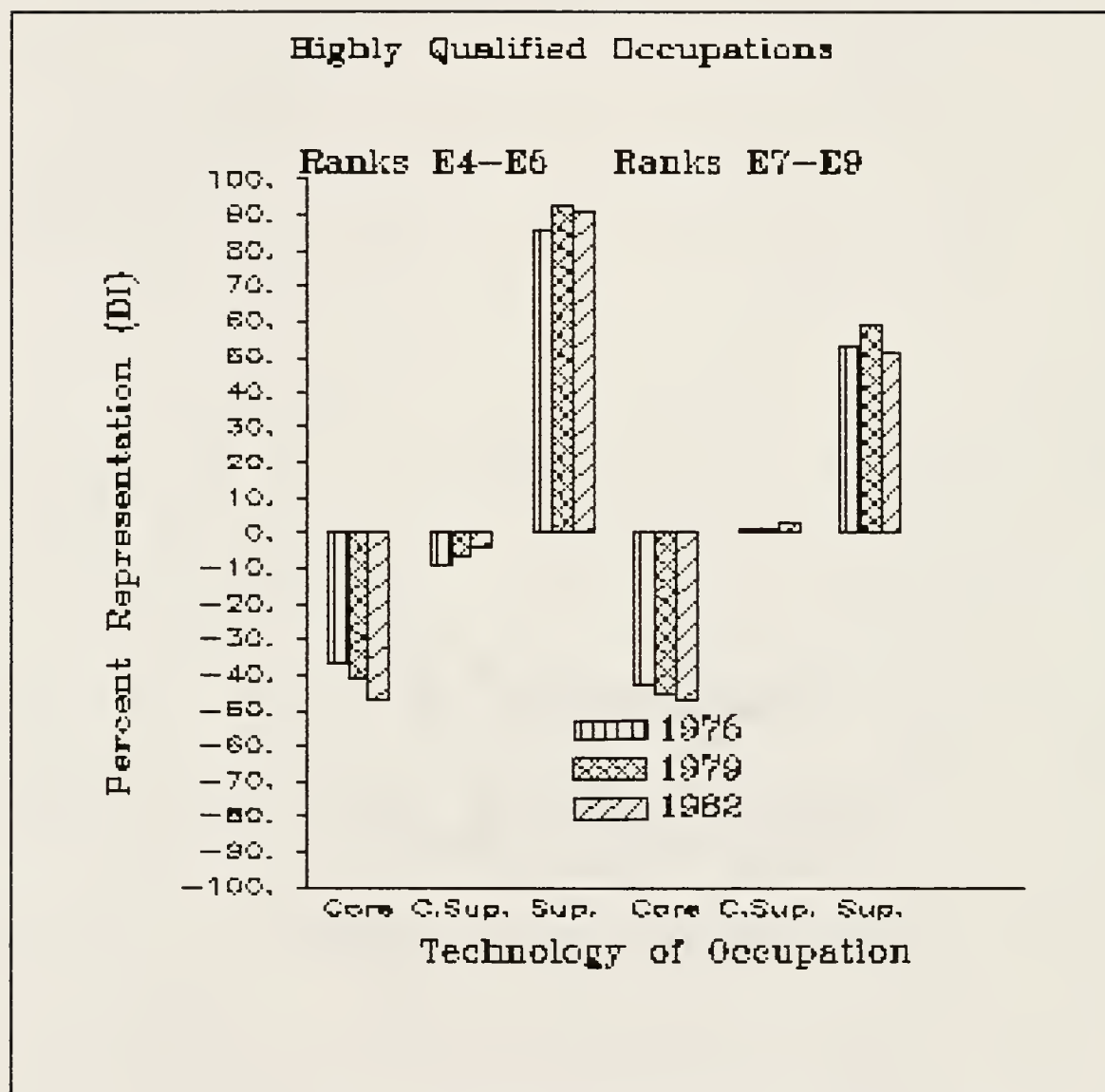


Figure 15

Black Core Technology Model

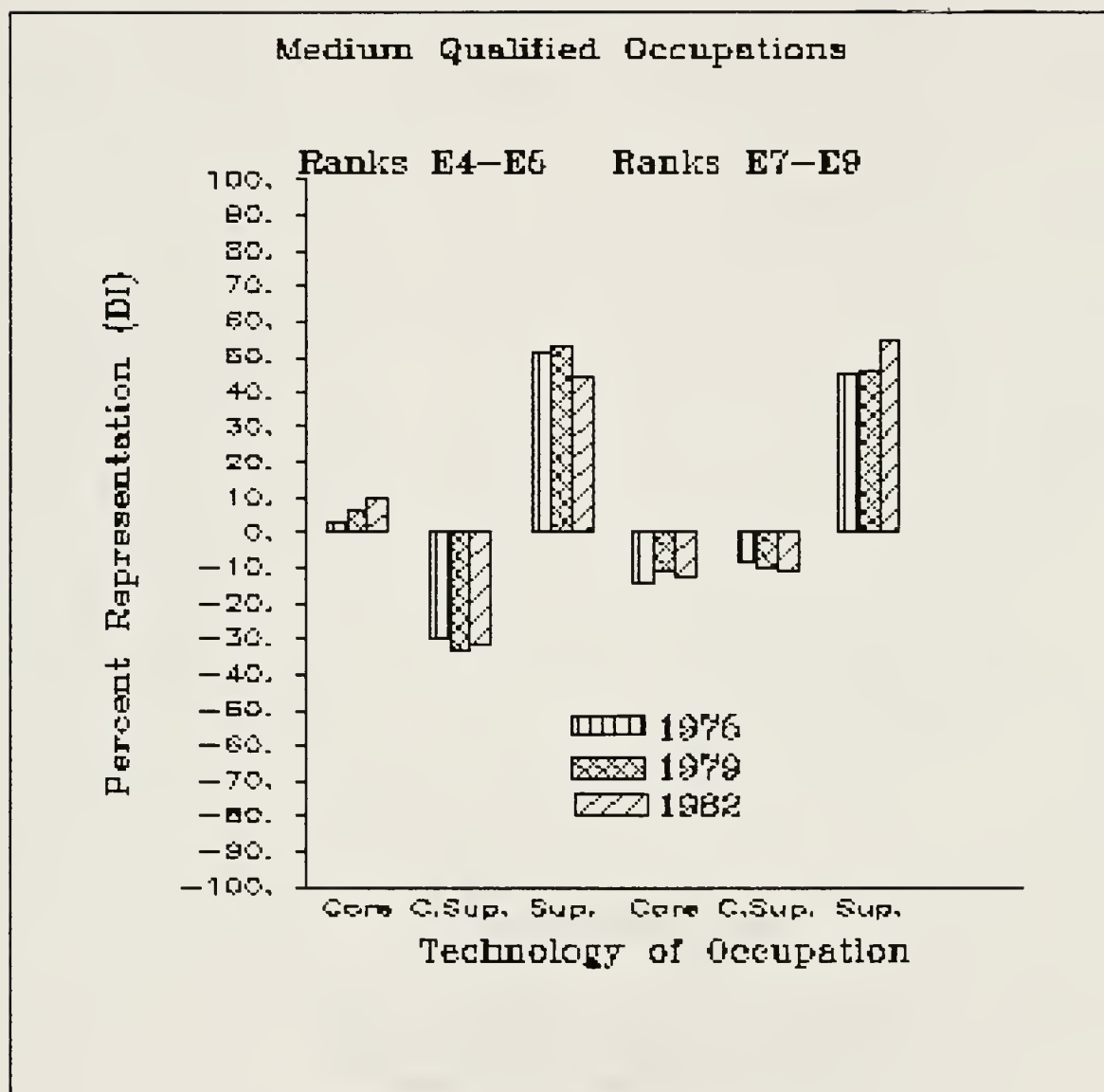


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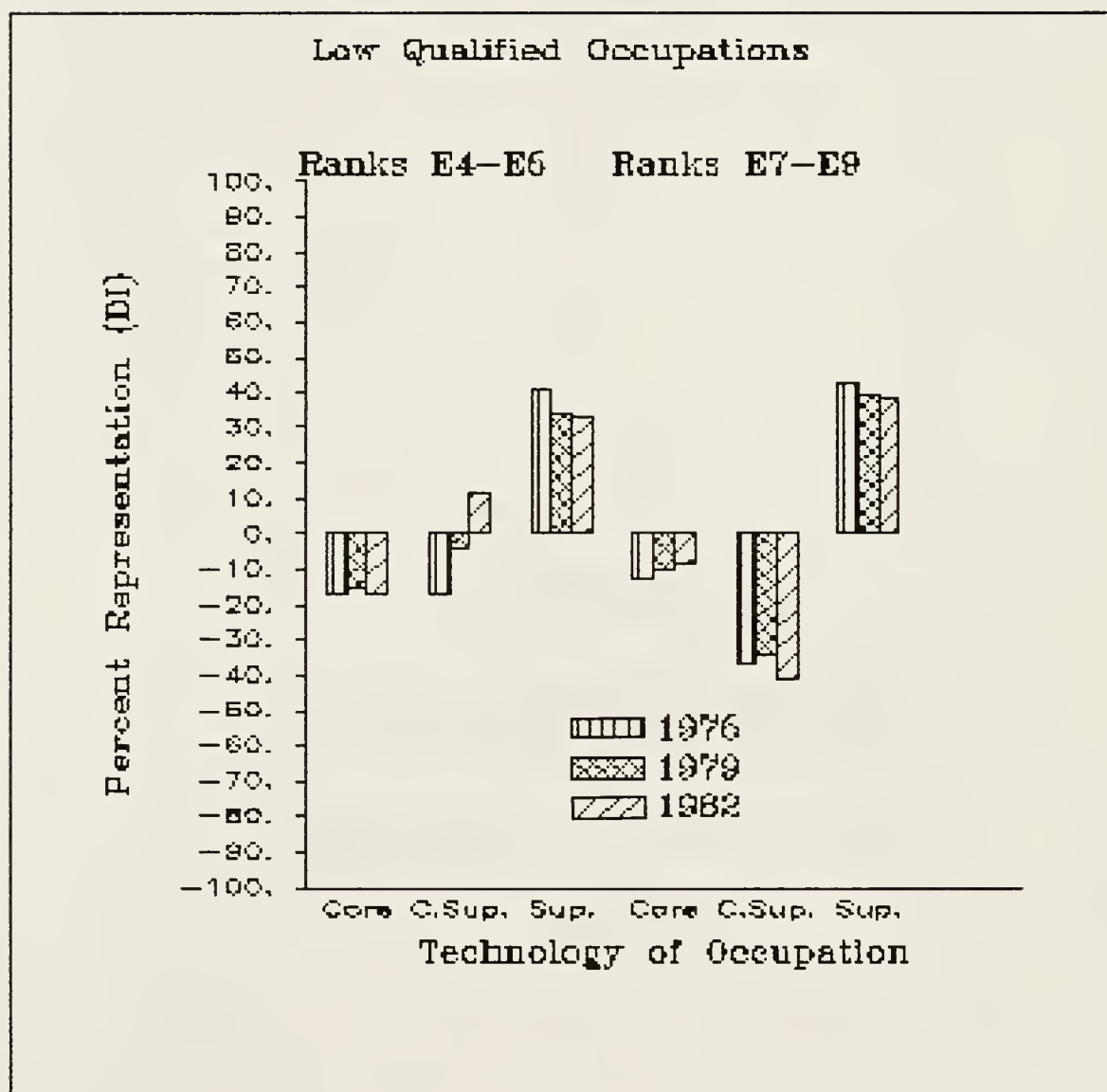


Figure 15--continued.

generally limited opportunities for blacks to service occupations, one would expect to find blacks most overrepresented in high ranks of low qualified support occupations. Also, affirmative action efforts which recently removed occupational barriers for blacks should have resulted in the least overrepresentation of blacks in low qualified occupations. Apparently, highly qualified blacks are still entering support occupations in greater percentages than in core or core support occupations.

The trends in the distribution of blacks between 1976 and 1982 are mixed. Core technology occupations, with the exception of low qualified occupations, tend to be moving toward substantial underrepresentation. Core support technology occupations, with the exception of low qualified E4-E6's, show little change between 1976 and 1982. Support technology occupations seem to have mixed trends with a slight tendency toward less overrepresentation.

Changes in the representation of blacks in core, core support, and support technology occupations provide some support for the Core Technology model. As can be seen in Figure 16, in highly qualified occupations, black representation has increased in all three categories of occupations. However, the smallest increase was in core technology occupations. The results in medium and low technology occupations was mixed. In medium qualified occupations, black representation in core technology occupations increased more than in any other categories.



This change is opposite that predicted by the model. Generally, the changes in ranks E7-E9 were much less than changes in ranks E4-E6. This finding is not surprising and reflects a large increase in the number of blacks in lower ranks for all categories of occupations. Changes in the more senior ranks can be expected to be slower because of the longer time required to gain promotion into those ranks.

Changes in the CDI as presented in Figure 16 support the Core Technology hypothesis in highly qualified occupations. In lower ranks there is a slightly lower percentage of blacks in core technology occupations and a higher percentage in core support and support occupations in 1982 than in 1976. In high ranks of highly qualified occupations, the percentage of blacks decreased in all three categories of occupations. However, the greatest decrease was in core technology occupations. This finding provides support for the model.

The Core Technology hypothesis is also partially supported for Hispanics. Figure 17 depicts the representation of Hispanics in core, core support, and support technology occupations. Hispanics are underrepresented in core technology occupations for all three levels of qualifications. Hispanic representation in core technology occupations does not appear to vary significantly with the qualification of occupations, although they are slightly more underrepresented in highly

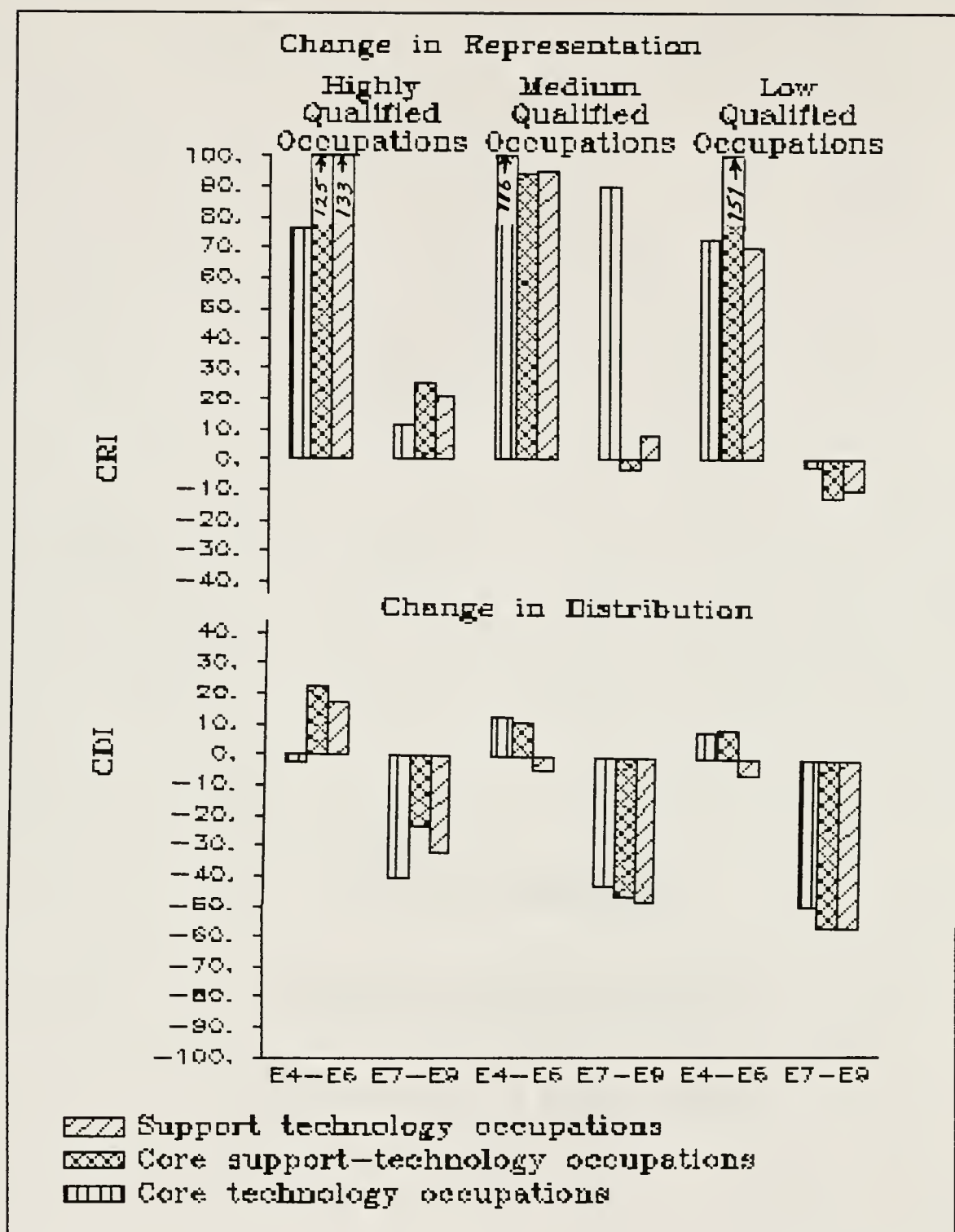


Figure 16

Black Core Technology Model  
 Changes in Black Representation and  
 Distribution Between 1976 and 1982

qualified occupations than others. Unlike the case of blacks, there also does not appear to be much difference in representation of Hispanics between high and low ranks.

The Core Technology hypothesis is not supported in core support occupations. Hispanics, like blacks, are also generally underrepresented in core support occupations, although the underrepresentation is somewhat less than in core technology occupations. Exceptions to this finding are in ranks E4-E6 in highly qualified and low qualified occupations which have almost exactly equal distributions and a sharply rising trend moving from 10 percent underrepresentation in 1976 to 19 percent overrepresentation in 1982.

The Core Technology hypothesis is also supported in support technology occupations. Hispanics in these occupations are highly overrepresented in each category of qualifications. With the exception of highly qualified E4-E6's who are more overrepresented than E4-E6's in medium and low qualified occupations, there is little variation in representation by qualification of occupation specialty. There is also little variation between ranks E4-E6 and ranks E7-E9.

Analysis of trends in the distribution of Hispanics between 1976 and 1982 as measured by the DI reveals no definite pattern. With the exception of highly qualified occupations which are moving slightly toward greater

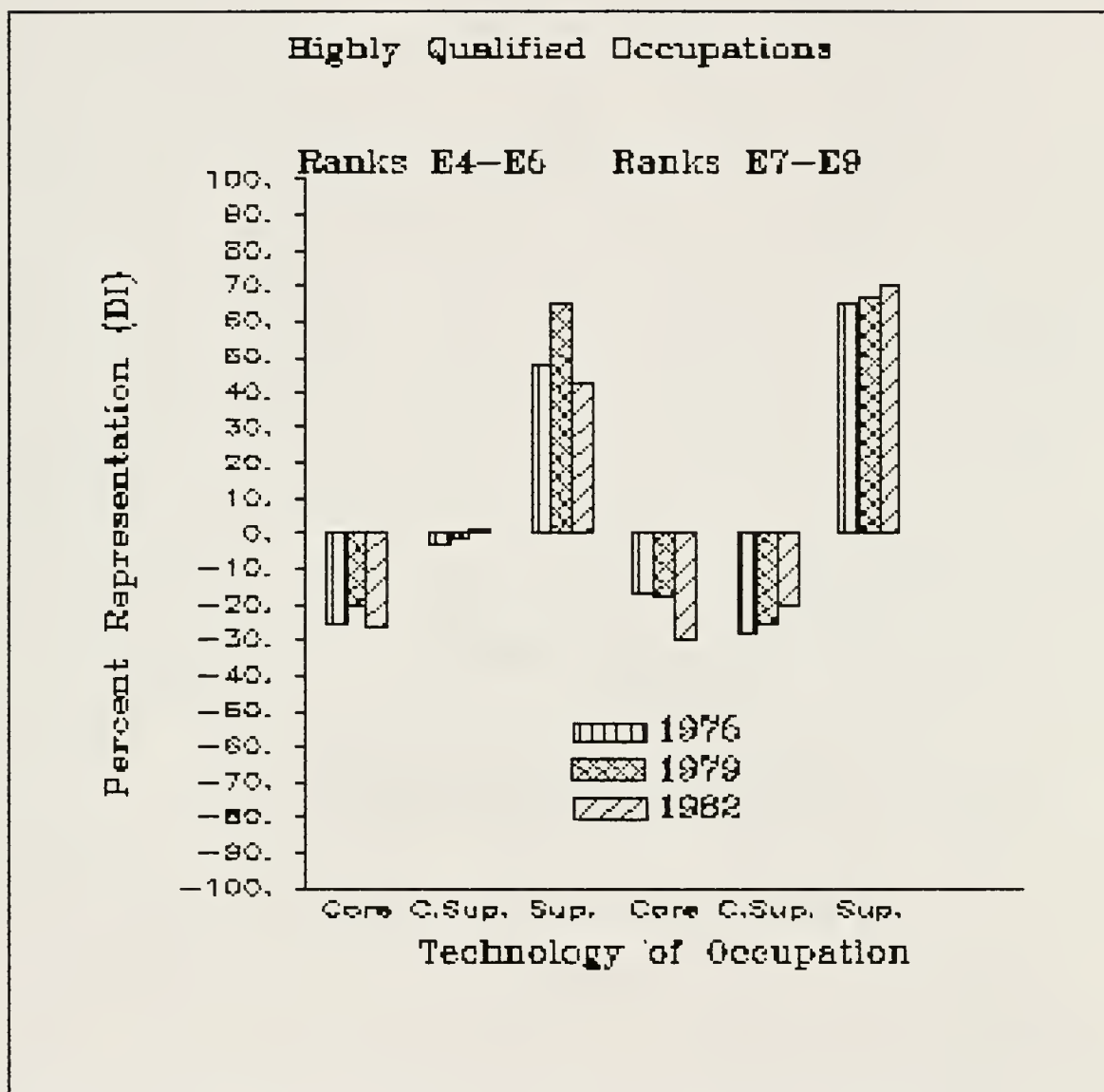


Figure 17

Hispanic Core Technology Model

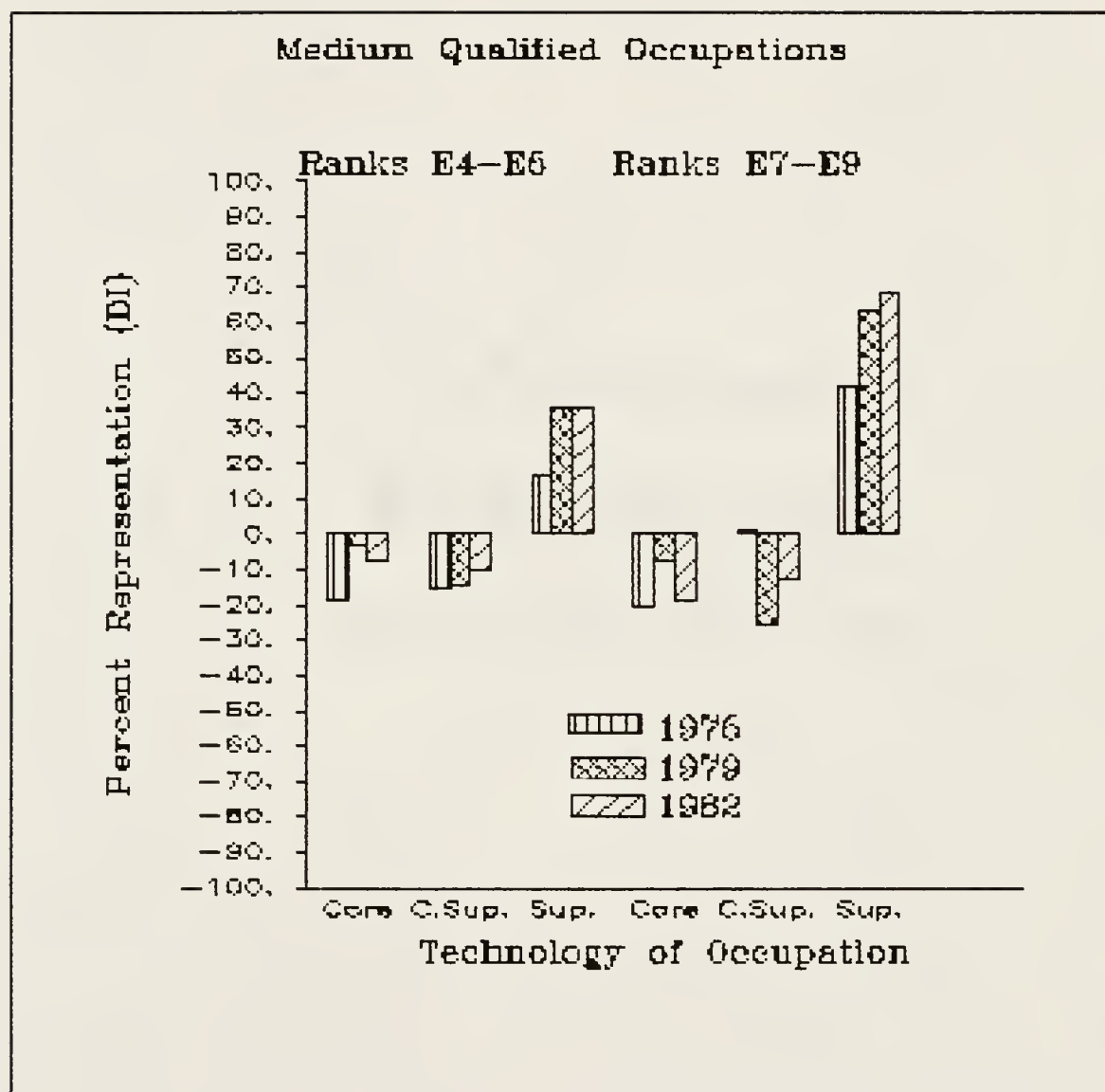


Figure 17--continued.

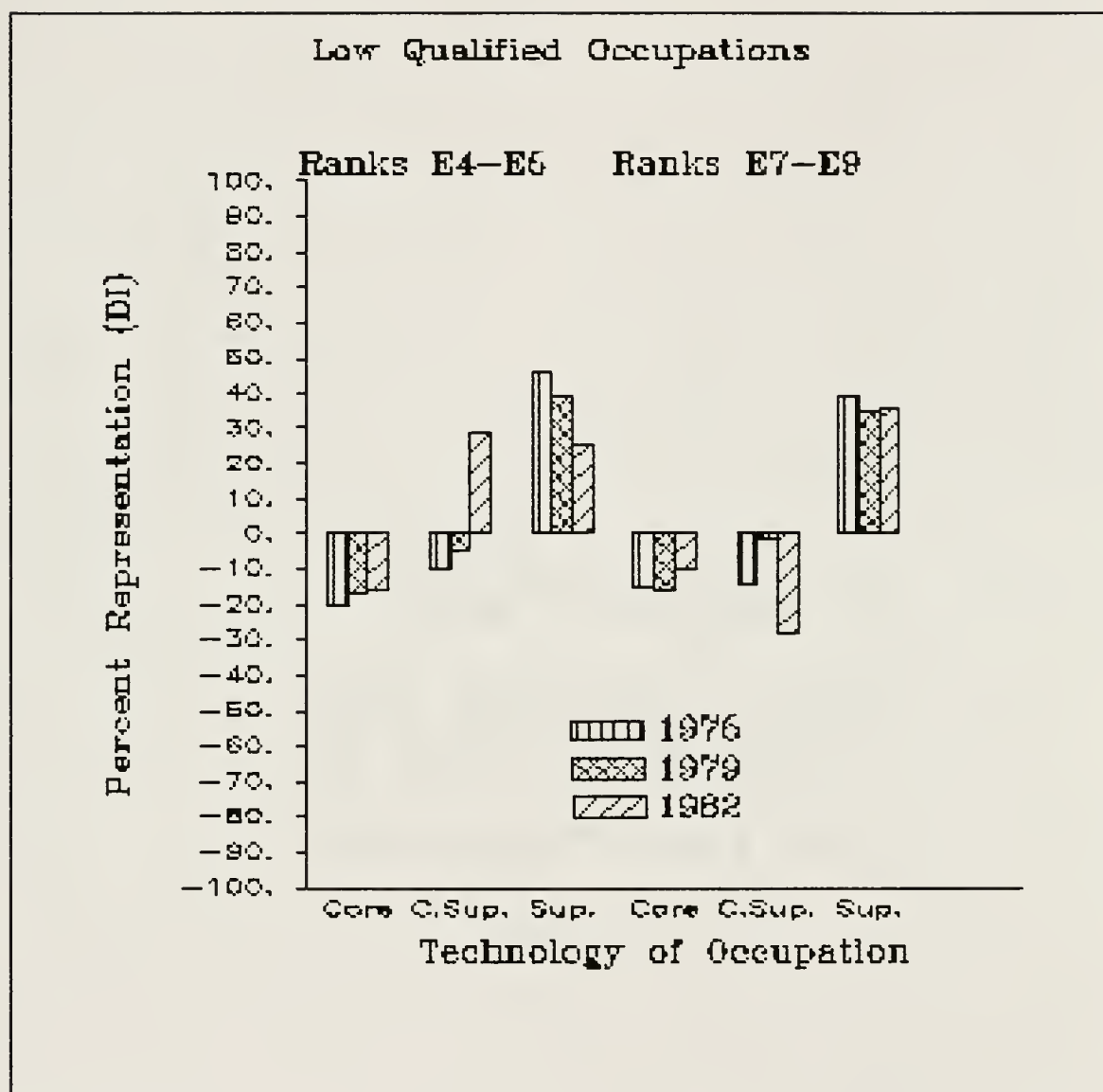


Figure 17--continued.

underrepresentation, Hispanic representation in core technology occupations are generally moving toward less underrepresentation. Hispanic representation in core support technology occupations is moving toward equality. Exceptions are low qualified occupations in which rank E7-E9 are tending toward greater underrepresentation, and ranks E4-E6 which are tending from underrepresentation to overrepresentation. Hispanic representation in support technology occupations seems to vary by qualification. Representation in highly qualified and low qualified occupations is moving slightly toward less overrepresentation, while, in medium qualified occupations, it is moving toward higher overrepresentation.

Changes in the representation and distribution of Hispanics in core, core support, and support technology occupations between 1976 and 1982 are contained in Figure 18. The CRI for Hispanics in highly qualified occupations is somewhat supportive of the Core Technology model in that increases in Hispanic representation has increased less in core technology occupations than it has in core support and support technology occupations. Changes in Hispanic representation in medium and low qualified occupations have no discernable relationship to the Core Technology model. Also, changes in the distribution of Hispanics as measured by the CDI is questionable because of the small change in the actual numbers of Hispanics, particularly in the higher ranks, between 1976 and 1982 (see Appendix G).



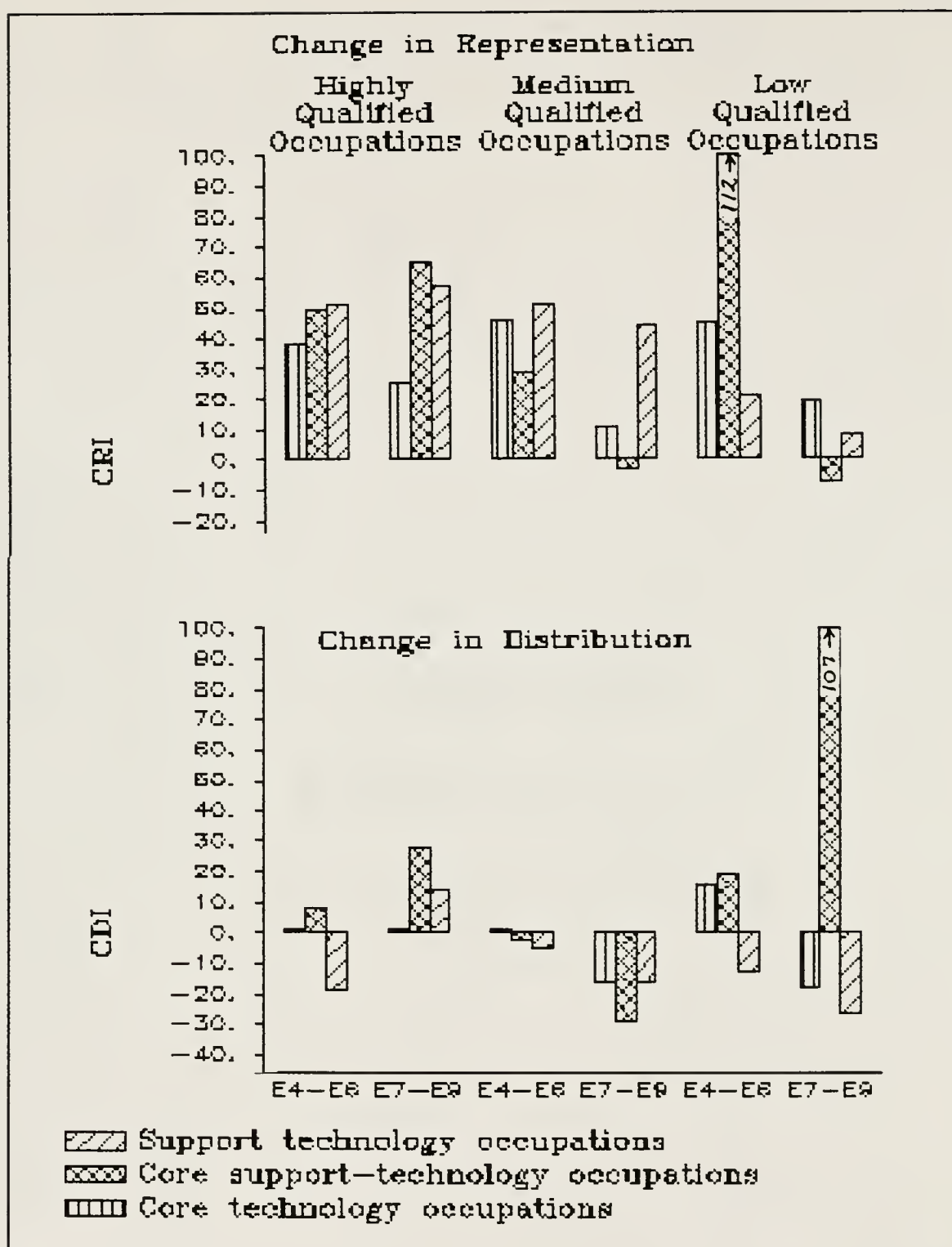


Figure 18

Hispanic Core Technology Model  
 Changes in Hispanic Representation  
 and Distribution Between 1976 and 1982

In summary, the Core Technology model is strongly supported.

1. The measurements suggest that, at a given point in time, both blacks and Hispanics are largely overrepresented in support technology occupations, and underrepresented in core and core support occupations.
2. Changes in representation suggest that, with the exception of Hispanics in highly qualified occupations, this condition is changing and both blacks and Hispanics are becoming more randomly distributed in this dimension.

## CHAPTER V DISCUSSION AND CONCLUSIONS

### Summary of Results

#### General

The purpose of this study was to examine the effectiveness of the Navy's achievement of the goal of occupational placement and advancement of blacks and Hispanics through affirmative action. While the findings of the three analytical models used in the study produced interesting results, the most significant and dramatic finding in the judgement of the author was the change in the overall ethnic composition of the Navy during the 6-year period of the study. Between 1976 and 1982, the Navy had a net loss of over 15,000 whites. There was a net loss of over 14,000 whites between 1976 and 1979 and a loss of slightly under 1,000 between 1979 and 1982. The change for blacks was drastically different from that of whites. Between 1976 and 1982 there was a net gain of 18,000 blacks. Approximately 10,000 were gained between 1976 and 1979, and slightly over 8,000 were gained between 1979 and 1982. The net change in Hispanics was different from both that of blacks and whites. There was a net gain of only 502 Hispanics between 1976 and 1982. Between 1976 and 1979,

there was a net loss of over 1,000 Hispanics, and between 1979 and 1982 there was a net gain of almost 2,000 Hispanics.

The net decrease in whites and increase in blacks is consistent with earlier findings from studies in the Army (Janowitz and Moskos, 1974). However, the quality of the blacks being enlisted in the Navy may differ from that reported in previous research. Implications of these findings will be discussed later in this chapter.

The finding in the case of Hispanics is surprising. Why this group should decrease between 1976 and 1979 and then increase between 1979 and 1982 is not fully explainable with the data available for this study. However, it is possible that there had been a general decline in the number of Hispanics in the Navy prior to 1976, and, once they had been identified as a separate ethnic group for purposes of affirmative action, the Navy increased recruiting efforts aimed specifically at Hispanics.

#### Cohort Model

Findings from the Cohort model strongly suggest that the cohort of qualified candidates does have an effect on promotion of black and Hispanic minorities. This effect seems to be most pronounced in highly qualified occupations. These findings are consistent with those of Meier (1978) and Hall and Saltzstein (1977). However, while Hall and

Saltzstein found that blacks were less affected by the availability of qualified candidates than were Hispanics, this study shows little difference in the effect of the cohort of qualified black and Hispanic candidates for advancement.

### Self-interest Model

Due to the few number of occupations where blacks and Hispanics held discretionary power, findings from the Self-interest model were questionable. The model did, however, provide some evidence that black and Hispanic minorities in discretionary positions do act in the interest of their own ethnic group. Thompson's (1976) conclusions that minority representation in discretionary positions (passive representation) leads to policies which favor minorities (active representation) are supported by the findings of this study. Active representation seems to be most pronounced in highly qualified occupations. Also, since minority representation increased more in high ranks than in low ranks, it would seem that active representation by minorities may have a stronger effect in promoting those minorities already in the occupation into higher ranks rather than by recruiting minorities into the occupation in lower ranks.

### Core Technology Model

Of the three models used in this study, the Core Technology model found the most support from the findings. For all levels of occupational qualification, both blacks and Hispanics tended to be overrepresented in support technology occupations and underrepresented in core and core-support technology occupations. As was the case with the other two models, the differences in representation were most pronounced in highly qualified occupations. Also, between 1976 and 1982, the trend, particularly in highly qualified occupations, was generally toward greater inequality. That is, in those categories where minorities were overrepresented, they tended to become more overrepresented, and, in those categories where they were underrepresented, they tended to become more so.

### Conclusions

#### General

Clearly, based on the results of this study, one can conclude that the Navy is moving toward achieving its goal of affirmative action in increasing black representation in highly qualified occupations. In 1982, 13.1 percent of the male enlistees in the Navy were black. This figure represents a 4.5 percent increase in black representation since 1976.

The Navy has been less effective in the achievement of affirmative action goals in recruiting Hispanics. Like most other institutions in the United States, the Navy just recently "discovered" Hispanics, and they have only been identified as an ethnic group by the Navy for the last seven years. This fact may account for the apparent lag in increasing their representation. However, whatever the reasons, in terms of organizational effectiveness, the Navy is failing to achieve its affirmative action goals with regard to Hispanics. Further, since Hispanics represent 7 percent of the draft-age population and only 3.4 percent of the Navy, the Navy is also failing to adapt to changes in the external environment, and, as a result, it is losing a valuable human resource.

Changes in the ethnic composition of the non-petty officer ranks were not the subject of this study. However, the data have revealed some significant findings which have policy implications and which should therefore be discussed. Table 4 illustrates the changes in the numbers of blacks, whites and Hispanics in the Navy between 1976 and 1982. In the non-petty officer ranks (E1-E3) the white and Hispanic population has declined, while the black population has increased. In the petty officer ranks (E4-E9) the white population has remained constant, while the black population has increased considerably. The Hispanic population has increased in percentage, but the increase in the actual number of Hispanics is relatively small.



Table 4

Changes in Navy Non-petty Officer  
and Petty Officer  
Populations Between 1976 and 1982

## Whites

Year	Ranks E1-E3	Ranks E4-E9
1976	141,789	209,811
1982	125,305	211,223
1982- 1976	-16,484	1,412
Pct. Change	-13.2	1.1

## Blacks

Year	Ranks E1-E3	Ranks E4-E9
1976	18,784	15,620
1982	24,589	28,340
1982- 1976	5,805	12,720
Pct. Change	23.6	44.9

## Hispanics

Year	Ranks E1-E3	Ranks E4-E9
1976	8,114	5,255
1982	6,499	7,372
1982- 1976	-1,615	2,117
Pct. Change	-24.8	28.8

Changes in the ethnic composition of the non-petty officer population clearly influence the composition of the petty officer population. The net loss of whites and Hispanics from the non-petty officer population has two possible explanations: (1) members of these groups are either not being enlisted in numbers proportional to their representation in the population, or (2) they are leaving the Navy prior to or at the completion of their first enlistment. Examination of data on Navy accessions reveals that the number of whites accessed has decreased from 81,124 in 1976 to 59,517 in 1982. During the same period, Hispanic accessions increased from 2,496 to 3,358. These data suggest that decreasing accessions best account for the decrease in whites in the Navy, while the decrease in Hispanics is more likely due to a combination of low recruiting and their leaving the Navy prior to or at the completion of their first enlistment.

In order to discuss the relationship between changes in the ethnic composition of the non-petty officers to changes in the petty officer population, one must examine the process by which recruits become petty officers. The Navy advancement system is based on the theory of human capital. Navy recruits bring with them human capital in education and skills. If whites entering the Navy were less educated or had less human capital than blacks, whites should be less successful in promotion and reenlistment and should leave

the Navy on completion of their first enlistment in a greater percentage than blacks. Conversely, blacks entering with higher levels of human capital should be more likely to be recommended for reenlistment and should tend to remain in the Navy in greater percentages.

Several researchers have suggested that the military is getting the best of the minority population, who see the military as a way out of the ghetto, and the worst of the white population, who have better job opportunities in civilian life. To substantiate their argument, these researchers point to the fact that the Army is gaining more highly educated blacks and lesser educated whites (Janowitz and Moskos, 1974; Moskos, 1976).

If high school education is used as a criterion for assessing military recruits as it was in Janowitz' and Moskos' studies, the same pattern which is occurring in the Army would seem to be occurring in the Navy. As can be seen in Figure 19, the percentage of black recruits who were high school graduates exceeded whites. In 1982, 86 percent of black Navy recruits were high school graduates while only 75 percent of whites were.

Since acceptance to "A" school and the resulting technical occupation specialty is based on both education and scores on a battery of aptitude tests, a better measure of the quality of recruits would be whether or not, based on the combination of education and test scores, they were

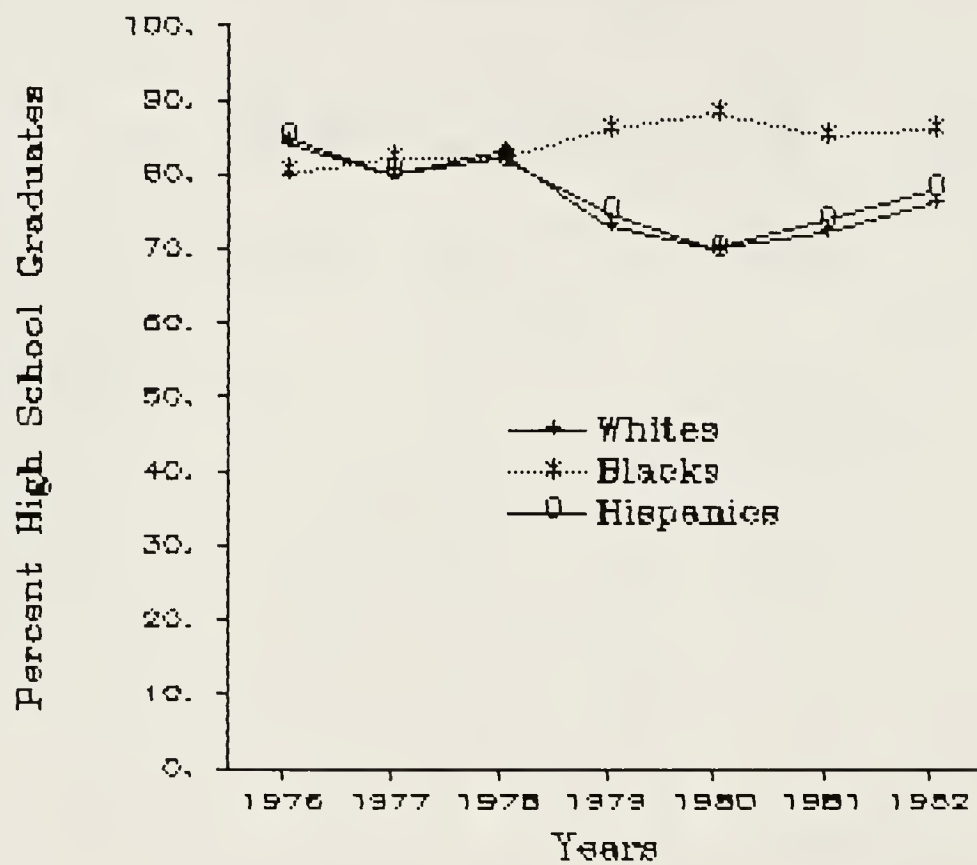


Figure 19

Percent of Navy Recruits  
Who Are High School Graduates

eligible for technical school. Figure 20 depicts the percent of Navy recruits who were eligible for technical school on completion of recruit training. This figure presents a remarkably different picture of the quality of Navy recruits than does Figure 19. The percent of school-eligible whites has been steadily increasing between 1976 and 1982, while the percent of school-eligible blacks and Hispanics has been generally declining, both in absolute terms and relative to whites.

The trends in education of Hispanic recruits has gone from 86 percent in 1976 to 78 percent in 1982. This change is consistent with the trend in Hispanic school eligibility which has gone from 84 percent in 1976 to 78 percent in 1982. Trends in education and school eligibility of whites and blacks have not followed a similar pattern. The percentage of white high school graduates has declined from 83 percent in 1976 to 75 percent in 1982, while their percent school eligibility has risen from 85 percent to 93 percent during the same period of time. The percent of black high school graduates has risen from 79 percent in 1976 to 96 percent in 1982, while their percent eligibility has declined from 80 percent to 65 percent. One would expect that, if the education levels of recruits has risen over time, the percent of recruits in the higher mental groups would follow a similar pattern. This was the case for whites, but not for blacks and Hispanics.

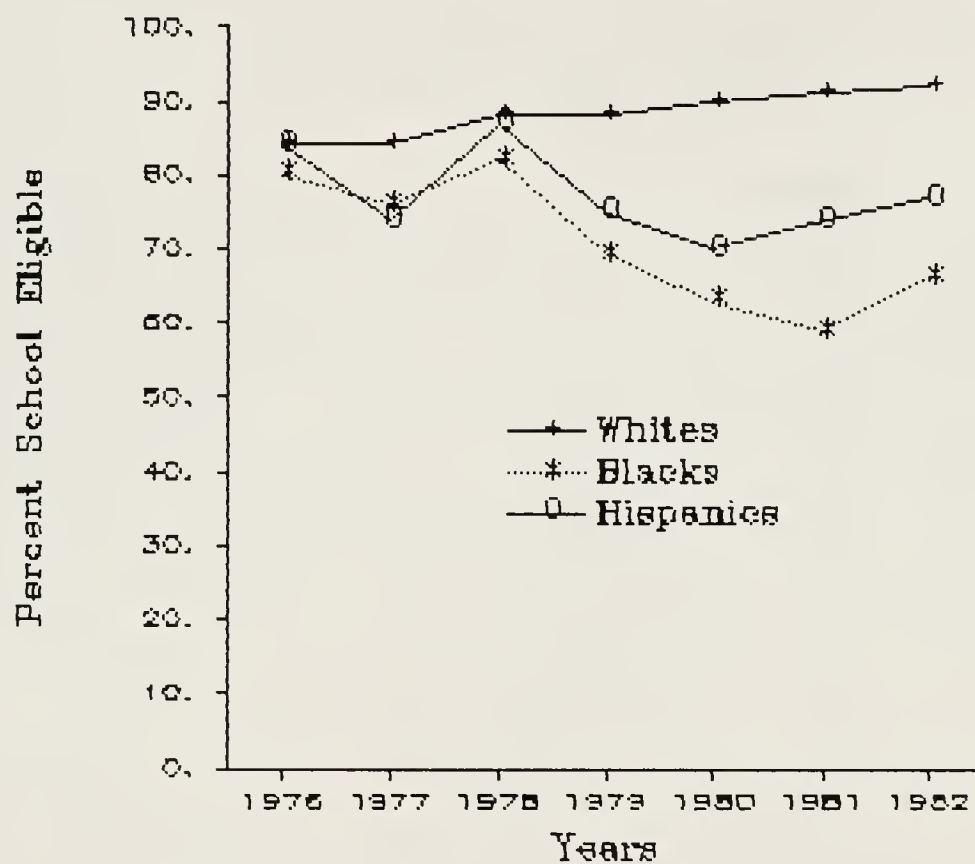


Figure 20  
Percent of Navy Recruits  
Who are School Eligible

Students for "A" school are selected almost entirely from mental groups I, II and the upper half of group III. Between 1976 and 1982, the percent of whites accessions in these mental groups remained steady at about 75 percent, while the percent of blacks declined from 52 to 35 percent. Since school eligibility is based on both education and aptitude test scores, the differences in the percent of school eligible whites and blacks can be attributed to differences in scores on standardized tests. These findings suggest that ASVAB tests may be acting to the disadvantage of blacks. Interestingly, the percent of Hispanics in mental groups I-III Upper declined from 62 percent in 1976 to 50 percent in 1982. However, the declining percentage of Hispanics in upper mental groups had little effect on the percent of Hispanic school eligibility.

Advancement into petty officer ranks in most occupations requires the completion of an "A" school. Therefore, due to the general decline in the percentage of school-eligible blacks and Hispanics, one would expect a similar pattern of representation in petty officer ranks. The data do not support this assumption. Between 1976 and 1982, whites had a net increase of 1.1 percent in petty officer ranks, while blacks and Hispanics in these ranks had net increases of 44.1 and 28.8 percent respectively.

It is clear that the advancement of blacks and Hispanics into petty officer ranks of the Navy is not



consistent with the school eligibility, education level, or mental group of the recruits. Both blacks and Hispanics have a lower percentage of school-eligible recruits than whites, but are nonetheless increasing in representation in petty officer ranks relative to whites. Clearly, something is occurring early in the career of enlistees which is affecting their school eligibility and occupational placement. These data also cast doubt on the assumption that the military is getting the best of the black population. In 1982, almost half of the black high school graduates recruited by the Navy were in mental group IV. These recruits are essentially untrainable and will undoubtedly leave the Navy on completion of their first enlistment because they are ineligible for reenlistment. Why such a high percentage of black high school graduates would score so poorly on the ASVAB is not clear. Either these recruits did not receive the same quality education as their white and Hispanic counterparts, or the military testing system is operating to their disadvantage.

Feagin and Feagin (1978) examine the effects of discrimination in one institution that adversely affect minorities in another institution. If minorities in the Navy are receiving less quality education than their white counterparts, then they could be expected to score lower on the ASVAB than whites with the same education level who had attended better schools. Inequality in the educational

institution would then have a side effect on Navy occupational placement and promotion.

The side effect of the educational institution may explain differences in black and Hispanic ASVAB scores compared to whites. However, the decreasing differential in the percent of blacks and Hispanics in the upper mental groups would suggest that the side effect of education is worsening. There is little evidence to suggest that, in recent years, the high school education of blacks and Hispanics has worsened to a degree which would account for the decline in the percent of recruits in these ethnic groups in upper mental groups.

The side-effect hypothesis may help to account for the declining percent of blacks who are school eligible. However, it does not account for the fact that Hispanic school eligibility was not adversely affected by their decline in percent of recruits in the upper mental groups.

School selection and promotion into petty officer ranks seems to have little relationship to the human capital of Navy enlistees and varies greatly based on the enlistees' ethnic group. These findings suggest that the testing and school selection policies of the Navy require examination in order to insure that they are not arbitrary and capricious or perpetuating the side effect of discrimination in education, but are, in fact, rewarding the human capital of enlistees. If this were occurring, discrimination in

education would have a side effect on the retention and promotion of minorities in the Navy. The side effect of education on Navy occupational placement and promotion appears to be affecting blacks and Hispanics differently. That is, if the decline in the percent of black and Hispanic recruits in the upper mental groups is due to the side effect of the education system, then one would expect that their school eligibility and promotion to petty officer ranks would be similar. This does not appear to be the case.

#### Core Technology Model

The findings from the Core Technology model support the conclusions of Butler (1976a, 1976b) and Nordlie, et al. (1975) in that both blacks and Hispanics, when qualifications are controlled, are overrepresented in support technology occupations.

Butler and Nordlie also found that blacks were overrepresented in core technology occupations in the Army such as gun crews and infantry units. This study provides evidence that, when more refined data are available which permit the control of qualifications of occupations, minorities in the Navy are still excluded from core technology occupations.

Much attention has also been given to the overrepresentation of blacks in the combat arms branches of

the Army. Results of this study would suggest that this overrepresentation may be found in core support or support technology occupations which happen to be subsumed under combat arms. More specific data on Army occupation specialties will be needed in order to determine whether or not this is actually the case.

The Core Technology model hypothesized that minorities would be underrepresented only in core technology occupations. However, it was found that both blacks and Hispanics were generally underrepresented in core support as well as core technology occupations. There are two ways that these findings can be interpreted. First, the model may be misspecified. A number of occupations in the Navy require both operation and maintenance of shipboard or aircraft equipment. Core technology was defined as those occupations which dealt primarily with the operation of equipment, while core support technology was defined as those occupations which dealt primarily with the maintenance of equipment. Obviously, a judgement call was required in assigning some occupations to one or the other of these categories. It may be that, if a different source of job descriptions were used, or, if a different investigator were to make the judgements, different results would occur.

The second way the findings can be interpreted is as follows: both core technology and core support technology occupations require high levels of technical training, and

much of this training is easily adaptable to high paying civilian jobs. For this reason, core and core support occupations may be more desirable than support occupations. It is therefore possible that this fact may result in discriminatory practices which have the effect of excluding minorities from both core and core support occupations. Further research should be conducted to determine which of the above interpretations best accounts for the data.

The final point in the Core Technology model that requires elaboration is the fact that both black and Hispanic overrepresentation increased with the degree of qualification of occupation. Butler (1976a) found that blacks in the Army were underrepresented in technical occupations when qualifications, as measured by AFQT score, were controlled. The results of this study support Butler's findings and provide evidence that highly qualified minorities may be being tracked into support technology occupations in the Navy. If this is the case, the Navy is not making effective use of these personnel.

#### Suggestions for Further Research

##### Improvements on the Current Research Design

Before suggesting areas for further research beyond the scope of this study, the flaws in this study will first be examined and an improved methodology suggested.

Both the Cohort and Self-interest models have methodological problems. In both models the occupation specialties were divided into two categories based on the representation of minority groups in low ranks (Cohort model) and high ranks (Self-interest model). It was assumed that these categories would contain a sufficient number of exclusive occupation specialties to demonstrate that changes attributed to one model were not artifacts of the other. The findings did not support this assumption. Both blacks and Hispanics were overrepresented in discretionary positions in very few occupation specialties (23 for blacks and 11 for Hispanics). As a result, the Self-interest model produced a large category of occupations where minorities were underrepresented in discretionary positions and a very small category where they were overrepresented. When an exclusive category of occupations was formed which consisted of only those occupations where minorities represented a large cohort in low ranks but were not also overrepresented in discretionary ranks, the category had too few occupations to produce reliable results. For blacks this category consisted of one highly qualified, one medium qualified, and three low qualified occupations. The results for Hispanics were similar.

Difference Indicators, DRI's and CRI's were nonetheless calculated for each of the exclusive categories of occupations for both models. All of the resulting



statistics fell within the range of the results of the models which contained all of the occupations. These results produced some evidence that one model is not an artifact of the other, however, since most of the categories of exclusive occupations contained only one occupation, the results are considered unreliable, and the relative effect produced by each of the models cannot be determined from this study.

Further research on the examination of the effects of promotion cohorts and minorities in discretionary positions might be improved by a design which analyzes each occupation as a separate observation rather than aggregating the occupations as this study did. This methodology would require the elimination of many of the occupations containing few minorities since small changes in these occupations would overly influence changes in the others.

#### Propositions for Further Investigation

Social science research studies traditionally conclude with recommendations for further research which would extend the study just completed. Typically, these recommendations call for more sophisticated data such as self-reported individual level data, longitudinal data, and larger or more representative samples. These data, the researchers argue, will permit a more sophisticated statistical analysis which will control for more variables and will therefore allow



theory to be more speedily advanced. There are four problems with this argument. First, it adds weight to the argument that sociologists are increasingly becoming providers rather than analysts of social data. Second, the data suggested are not available and are unlikely to become so. Therefore, the argument that knowledge will be extended upon their availability becomes moot. Third, this study focuses on the organization and the composition and behavior of the system, not of its individual components. The organizational system is the appropriate level of analysis for the study of minority groups in organizations. The tendency toward reductionism in sociology has resulted in much misplaced effort. Fourth, individual level data, national samples and advanced statistical procedures have not resulted in quantum advances in either organizational or minority group relations theory. Therefore to argue that, in this case, more data will extend knowledge cannot be substantiated by historical evidence.

The data used in this study have problems which have already been pointed out. However, one must keep in mind that they are still some of the best administrative data available on any complex organization. It is to the Navy's credit that such data has not been classified and is available to outside researchers. Given the direction on disclosure of public information that the Reagan administration has taken, the continuing availability of even these data is questionable.

Personnel surveys in the Navy require the approval of the Chief of Naval Personnel. Current policy is to authorize surveys or access to personnel data only to support evaluation research of Navy programs. The chances of gaining access to personnel data for the purpose of investigating social theory approximates zero. Therefore, to suggest further research which would require more extensive data is to indulge in idle speculation.

If more elaborate data are not available, the question becomes, what can be done with the data that are available? The reports used for this study contain data on the entire Navy which are aggregated and reported monthly. These reports identify the following variables:

1. Race (White, black, Hispanic, Filipino, American Indian, Asian/Pacific Island).
2. Sex.
3. Rank (E1-E9, W1-W4, and O1-O7).
4. Enlisted Occupation Specialty.
5. Officer Specialty Designator.
6. Education level of accessions by race and sex.
7. Mental group of accessions by race and sex.
8. ASVAB test scores required for each occupation specialty.
9. "A" School assignments by race and sex.
10. Accessions, reenlistments and separations by race and sex.

## 11. Types of discharges by race and sex.

There are numerous propositions related to his study which could be investigated with the above data. The remainder of this section will suggest propositions related to this study which might be investigated.

Janowitz and Moskos (1974) predicted a "tipping" effect as minority representation in the armed forces increased. The tipping point would be that percent of minorities which would cause whites to leave the organization. If Janowitz is correct, the changes in minority representation in occupation specialties would be non-linear, and would be predicted to change at a particular percent of minority representation.

Since the early 1970s, the Navy has made a major effort to increase the representation of women in the Navy and to place them in occupations which were previously occupied only by males. Kanter (1977) found that the success of women in organizations was improved by support groups of other women. If this is the case, then occupations which have traditionally been open to women should have larger support groups than those which have just recently opened. Therefore, the traditional occupations could be expected to increase in female representation more rapidly than those occupations where women were recently admitted than in those occupations where such a support group is lacking.

This study demonstrated racial inequalities in representation with regard to occupational placement which are not explainable by the differences in human capital of Navy recruits. Continued research should be conducted which would move toward identifying the organizational mechanisms by which this inequality is occurring. As Butler (1979) pointed out, inequality in promotion and occupational placement is not explainable by the failure of minorities to meet universalistic criteria such as aptitude tests and education. Navy applicants' occupational choices are affected by the information given to them by recruiters. It is also affected by instructors and staff at technical schools who make judgements regarding the achievement of students. There is a high degree of subjective judgement involved in both of these areas as well as high potential for bias in judgements based on race, ethnicity, and sex.

Promotions in the Navy are affected not only by standardized tests and other universalistic criteria, but also by supervisors and commanding officers who make subjective judgements on evaluations, recommendations for advancement, school selection, awards, reenlistments, and judicial and non-judicial punishment, all of which have high influence on a person's naval career. Clearly, there is high potential for racial and ethnic bias in these judgements.

If the above subjective judgements are influenced by race, over time, they would produce a cumulative negative effect on the promotion of minorities. The degree of this cumulative effect could be tested by correlating the percent of each ethnic group in mental group and education level with subsequent representation in progressively higher ranks and in eligibility for reenlistment. If there is a cumulative effect on minorities, their representation in higher ranks and their eligibility for reenlistment should decrease in relationship to whites with the same mental and education background. If there is no cumulative effect, then rank and eligibility for reenlistment should be predicted by the education and mental group of recruits and should not be related to recruits' race.

The Core Technology model could be further tested to determine whether there are similar patterns in the officer corps of the Navy. Line officers represent the core technology of the officer corps. Limited duty and staff officers (engineers, medical and legal specialists) represent peripheral technology. If the Navy officer corps protects the core technology from minority intrusion, one would expect that, when education was controlled, minorities would be underrepresented in line ranks and overrepresented in staff and limited duty ranks.

Concluding Comment

Finally, it must be kept in mind that this study intentionally used statistical procedures which reduced the apparent underrepresentation of minorities in senior ranks and highly qualified occupations due to the effects of past discriminatory treatment. Both blacks and Hispanics are still progressively underrepresented in higher ranks, particularly ranks E8 and E9, regardless of the level of qualification of occupation. Minorities also continue to be underrepresented in the most desirable occupations and in power positions. It is hoped that this study will contribute to further research which will investigate how these conditions developed, why they continue to exist, and how they might be alleviated. However, it is important to remember that changing inequality in the Navy does not require further social research or the further development of social theory. It requires administrative action to remove barriers to equality of opportunity.

W.E.B. DuBois (1944:346) indicted social scientists in his statement

Social sciences from the beginning were used as an instrument to prove the inferiority of the people of the world who were being used as slaves for the comfort and culture of the masters.

If this study does stimulate further scholarly or administrative investigation into affirmative action in complex organizations, it is hoped that DuBois indictment will be kept in mind, and that the primary goals of future

efforts will be to improve the conditions of people in organizations rather than to satisfy intellectual curiosity.



APPENDIX A  
EXPECTED PERCENTAGES  
FOR RANKS E4-E9

Blacks

Rank	All Occupations		Highly Qualified Occupations		Medium Qualified Occupations		Low Qualified Occupations	
	1976	1982	1976	1982	1976	1982	1976	1982
E4	8.08	15.22	5.92	11.97	8.96	15.90	9.63	17.42
E5	6.25	12.20	4.19	9.34	6.78	14.32	8.15	13.58
E6	6.12	8.39	3.49	5.72	6.11	9.08	8.86	10.77
E7	6.58	5.96	3.50	4.01	6.49	6.15	9.49	7.89
E8	5.13	6.00	1.94	2.83	5.27	5.68	7.59	8.83
E9	4.41	6.54	2.65	3.94	3.58	5.66	7.25	10.39
E4-6	6.90	12.43	4.65	9.34	7.36	15.53	8.92	14.59
E7-9	6.11	6.02	3.12	3.78	6.04	6.02	8.91	8.34

Hispanics

Rank	All Occupations		Highly Qualified Occupations		Medium Qualified Occupations		Low Qualified Occupations	
	1976	1982	1976	1982	1976	1982	1976	1982
E4	3.37	3.70	2.88	3.22	3.42	3.51	3.84	4.24
E5	2.10	3.12	1.75	2.91	2.20	3.20	2.41	3.29
E6	1.65	2.60	1.28	2.15	1.64	2.63	2.03	3.08
E7	1.50	1.82	1.09	1.61	1.60	1.82	1.80	2.03
E8	1.24	1.40	0.43	0.97	1.55	1.25	1.66	1.86
E9	1.05	1.16	1.17	1.12	0.74	1.32	1.16	1.09
E4-6	2.44	3.21	2.05	2.82	2.74	3.17	2.85	3.65
E7-9	1.41	1.67	0.98	1.44	1.53	1.68	1.72	1.91

### Occupations With Blacks Overrepresented in Ranks E4-E6 in 1976

### Occupations With Blacks Underrepresented in Ranks E4-E6 in 1976

**\*\* Expected Number < 10.**

## 136

### Occupations With Hispanics Underrepresented in Ranks E4-E6 in 1976

Rank	Highly Qualified Occupations						Medium Qualified Occupations						Low Qualified Occupations					
	1976		1979		1982		1976		1979		1982		1976		1979		1982	
	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N
E9	-15	9	-25*	6	-43	6	-66*	1	-40*	1	-83*	1	-33	3	-61	4	-5*	4
E8	-35*	4	-51	6	-53	7	-21	12	-13	12	-33	8	6	22	-33	20	-35	16
E7	-27	39	-32	46	-41	48	-33	38	-34	40	-36	39	-52	21	-45	35	-48	31
E7-9	-27	52	-35	58	-44	61	-31	51	-32	56	-40	48	-34	46	-37	59	-43	51

**\*\* Expected Number < 10.**







APPENDIX F  
DIFFERENCE INDICATORS AND N'S  
FOR BLACK CORE TECHNOLOGY MODEL

Core Technology Occupations

Rank	Highly Qualified Occupations						Medium Qualified Occupations						Low Qualified Occupations					
	1976			1979			1976			1979			1976			1979		
	DI	N	DI	DI	N	DI	DI	N	DI	DI	N	DI	DI	N	DI	DI	N	DI
E9 -25*		51 -11*		51 -51		51 -39		81 -20		161 -35		151 -39		311 -30		421 -24		591 -59
E8 -5		201 -34		161 -65		91 -26		371 -16		431 -20		431 -19		911 -6		1421 -15		1141 -114
E7 -52		481 -50		511 -41		661 -10		2091 -9		2291 -10		2091 -8		4871 -8		4401 -2		4031 -403
E6 -6		1031 -34		1501 -42		1871 -5		4581 -1		4681 -4		6731 -13		8441 -9		8261 -3		1,081 -1,081
E5 -29		2111 -35		3011 -43		4901 -3		5871 -2		7791 -16		1,4461 -18		8391 -13		1,1761 -15		1,8281 -1,828
E4 -39		3211 -48		3751 -53		4631 -12		7701 -15		1,3621 -17		1,6591 -19		1,1711 -20		1,8011 -22		2,6821 -2,682
E7 -9 -43		731 -45		721 -47		801 -14		2541 -11		2881 -13		2671 -12		6091 -10		6241 -8		5761 -576
E4 -6 -37		6351 -41		8261 -47		1,1401 -3		1,8151 -6		2,6091 -10		3,7781 -17		2,8541 -15		3,8031 -17		5,591 -5,591

Core Support Technology Occupations

Rank	Highly Qualified Occupations						Medium Qualified Occupations						Low Qualified Occupations					
	1976			1979			1976			1979			1976			1979		
	DI	N	DI	DI	N	DI	DI	N	DI	DI	N	DI	DI	N	DI	DI	N	DI
E9 -8		191 -3		191 -23		391 -20*		111 -9		101 -4		141 -		01 -		01 -		01 -
E8 -46		81 -11		201 -7		241 -15		311 -4		391 -20		361 -30		401 -37		411 -30		491 -49
E7 -8		1331 -1		1421 -0		1571 -9		1751 -12		1741 -10		1651 -39		621 -34		551 -52		331 -33
E6 -2		3081 -4		3551 -6		4991 -17		3461 -22		3111 -20		4391 -25		1601 -28		1441 -24		1641 -164
E5 -9		4811 -9		6251 -10		1,1761 -29		3451 -32		4851 -35		8151 -15		1811 -11		1751 -21		3591 -359
E4 -13		7001 -6		1,1131 -2		1,6901 -39		4901 -37		7691 -32		1,1451 -10		2141 -19		3721 -31		5811 -581
E7 -9 -1		1601 -0		1811 -3		2201 -8		2161 -10		2241 -11		2151 -37		1021 -34		961 -41		821 -82
E4 -6 -9		1,4891 -6		2,0931 -4		3,3651 -30		1,1811 -33		1,5651 -31		2,3991 -17		5551 -4		6911 -12		1,1041 -1,104

\*Expected Number < 10.

# Support Technology Occupations

Rank	Highly Qualified Occupations						Medium Qualified Occupations						Low Qualified Occupations					
	1976		1979		1982		1976		1979		1982		1976		1979		1982	
	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N
E9	49*	10	53	6	-18	9	44*	11	64*	16	71	18	88	44	70	45	53	55
E8	54	17	69	26	102	37	84	41	44	33	85	44	79	88	49	101	66	103
E7	51	124	61	132	49	142	39	146	45	150	45	128	32	344	32	278	26	225
E6	64	263	48	284	64	422	45	299	47	293	53	407	36	653	30	586	19	578
E5	68	339	96	459	107	962	42	413	62	558	39	875	43	706	36	739	27	1,189
E4	140	539	113	801	113	1,026	59	631	47	914	41	1,039	46	1,009	34	1,529	39	2,264
E7-9	53	151	59	164	51	188	45	198	46	199	55	190	43	476	39	424	38	383
E4-6	86	1,141	93	1,544	91	2,410	51	1,343	53	1,765	44	2,321	41	2,368	34	2,854	33	4,031

\* Expected Number < 10.



APPENDIX G  
DIFFERENCE INDICATORS AND N'S  
FOR HISPANIC CORE TECHNOLOGY MODEL

Core Technology Occupations

Rank	Highly Qualified Occupations						Medium Qualified Occupations						Low Qualified Occupations					
	1976	1979	1982	1976	1979	1982	1976	1979	1982	1976	1979	1982	1976	1979	1982	1976	1979	1982
E9	-66*	1	45*	3	106*	6	-*	0	-32*	4	-44*	3	-26*	6	8	7	22	10
E8	18*	5	7*	16	-32*	6	-49	14	13	12	1	12	-15	21	1	33	-22	22
E7	31	27	-26	28	-38	28	-20	46	-5	64	-20	55	-14	86	-20	89	-9	97
E6	-31	50	-29	65	-26	89	-3	126	-13	110	-4	195	-15	187	-25	171	-14	276
E5	-18	102	-18	183	-24	202	-14	159	-8	240	2	286	-26	223	-16	406	-15	444
E4	-28	186	-22	186	-30	185	-6	245	8	357	-14	269	-20	461	-17	590	-18	694
E7-9	-17	33	-18	39	-30	40	-20	60	-7	80	-19	70	-15	113	-16	129	-10	129
E4-6	-25	338	-20	434	-26	475	-19	530	-3	707	-7	750	-20	871	-17	1,167	-16	1,414

Core Support Technology Occupations

Rank	Highly Qualified Occupations						Medium Qualified Occupations						Low Qualified Occupations					
	1976	1979	1982	1976	1979	1982	1976	1979	1982	1976	1979	1982	1976	1979	1982	1976	1979	1982
E9	-12*	8	-26*	5	-34*	6	-16*	2	19*	4	-5*	3	-	0	-	0	-	0
E8	-39*	2	7	3	-55*	4	-7	10	-12*	9	-40*	6	-20	10	-21	11	2	15
E7	-32	26	-21	41	-13	55	1	48	-30	37	-8	50	-11	17	81	21	-55	8
E6	-31	80	-10	135	-1	197	-19	88	3	115	-8	147	-30	34	-36	32	-11	55
E5	7	206	8	350	-5	386	-9	144	-9	223	-24	214	-25	47	-1	70	23	88
E4	6	415	-4	375	5	484	-1	306	-25	256	13	364	-16	110	16	114	62	175
E7-9	-28	36	-25	49	-20	65	1	60	-25	50	-12	59	-14	27	0	32	-28	78
E4-6	-3	701	0	860	1	1,067	-15	538	-14	594	-10	725	-10	191	-5	216	29	318

\*Expected Number < 10.

# Support Technology Occupations

Rank	Highly Qualified Occupations						Medium Qualified Occupations						Low Qualified Occupations					
	1976		1979		1982		1976		1979		1982		1976		1979		1982	
	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N	DI	N
E9	103*	6	38*	3	-3*	3	153*	4	47*	4	103*	4	560*	6	58*	5	-47*	2
E8	23*	3	69*	8	67*	14	22*	8	39*	8	72*	8	17	17	17	17	46	19
E7	65	42	67	51	67	64	42	37	71	47	69	44	33	66	42	69	41	65
E6	99	117	54	119	36	131	55	82	37	77	27	98	45	159	66	189	37	190
E5	84	124	17	131	59	230	42	134	37	160	43	201	64	240	41	274	26	285
E4	45	158	54	191	42	185	13	171	34	231	33	216	35	383	29	463	20	475
E7-9	65	51	67	62	70	81	42	49	63	59	69	58	39	89	35	91	36	86
E4-6	48	398	65	441	43	546	17	387	36	468	36	515	46	782	39	926	26	950

\* Expected Number < 10.

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## BIOGRAPHICAL SKETCH

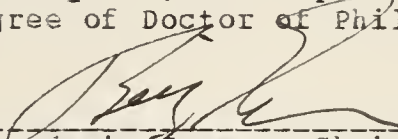
Gary Joseph Zucca was born on June 14, 1938, in Hermosa Beach, California. He attended the University of Southern California and, after receiving his Bachelor of Science in medical technology in 1961, enlisted in the U.S. Navy as an Officer Candidate Seaman Apprentice. He was commissioned as an Ensign in November, 1961.

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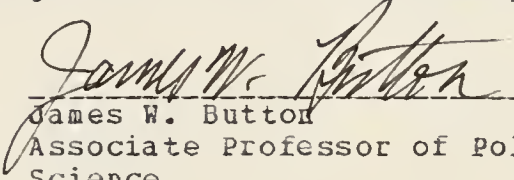
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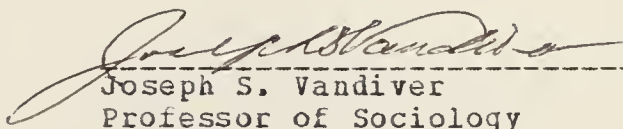
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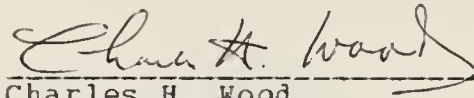
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This dissertation was submitted to the Graduate Faculty of the Department of Sociology in the College of Liberal Arts and Sciences and to the Graduate School, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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